



Regulatory Investment Test for Distribution (RIT-D)

Connection of a Large Load Customer in the Brisbane CBD Network Area

Notice of Screening for Options

29 October 2024

Connection of a Large Customer connection in the Brisbane CBD Network Area

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EXECUTIVE SUMMARY

About Energex

Energex Limited (Energex) is a subsidiary of Energy Queensland Limited and manages the electricity distribution network in the growing region of Southeast Queensland which includes the major urban areas of Brisbane, Gold Coast, Sunshine Coast, Logan, Ipswich, Redlands and Moreton Bay. Our electricity distribution area runs from the NSW border north to Gympie and west to the base of the Great Dividing Range.

Our electricity network consists of approximately 54,200 kilometres of powerlines and 680,000 power poles, along with associated infrastructure such as major substations and power transformers.

Today, we provide distribution services to more than 1.4 million domestic and business connections, delivering electricity to a population base of around 3.4 million people.

Identified Need

Energex has received a connection application for a major customer to connect a large load to the 11 kV network in the Brisbane CBD. The connection arrangement, which has been agreed by, in consultation with the customer, is for a dedicated connection which is composed of both Alternate Control Services (ACS) and Standard Control Services (SCS) as defined in Chapter 10 of the National Electricity Rules (NER).

Works classified as ACS requires that customer fund the cost directly. SCS works are those that are central to the supply of electricity and provided by Energex, including design, construction and operation of the shared network. Cost for these services is recovered through network charges for all relevant customers.

This RIT-D only considers the SCS component, as this is network expenditure, under the identified need.

As a requirement of Energex to provide high reliability and security of supply to Brisbane CBD customers, Energex is planning to install three diverse routed feeders to form a three feeder mesh from Charlotte Street substation to the customer's site in George Street, Brisbane City and establish a C&I substation to supply the customer. These feeders will have N-1 redundancy. This network design will allow other new customer to be connected to this mesh network in future. One of the three feeders has to be installed via Albert Street to connect another large customer. The completion date for the works is October 2027, which is driven by the customer timeframes for connection.

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Approach

The National Electricity Rules (NER) require that, subject to certain exclusion criteria, network business investments for meeting service standards for a distribution business are subject to a Regulatory Investment Test for Distribution (RIT-D). Energex has determined that network investment is essential in this case for it to continue to provide electricity to the consumers in the Greenvale supply area in a reliable, safe and cost-effective manner. Accordingly, this investment is subject to a RIT-D. An internal assessment has been conducted and it has been determined that there is no non-network option that is potentially credible, or that forms a significant part of a potential credible option that will meet the identified need or form a significant part of the solution. This Notice has hence been prepared by Energex in accordance with the requirements of clause 5.17.4(d) of the NER.

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1. BACKGROUND

1.1. Geographic Region

Charlotte Street 110/11kV Substation (SSCST) is located in Charlotte Street, Brisbane City. It is one of the four substations that supply the Brisbane CBD and supplies approximately 44% of the Brisbane CBD load. It is supplied from Powerlink’s Belmont Bulk Supply Substation (SSH3) via Wellington Road Substation (SSWRD) with two 110kV feeders, 7321 and 7232 and has open ties to two 110 kV feeders, 829 and 833 from Ann Street Substation (SSAST). These substations form part of the 110kV transmission network with interconnections to surrounding Zone Substations as shown in Figure 1. A planning report was developed in consultation with the customer with options presented, with connection to the 11kV network being the preferred solution.

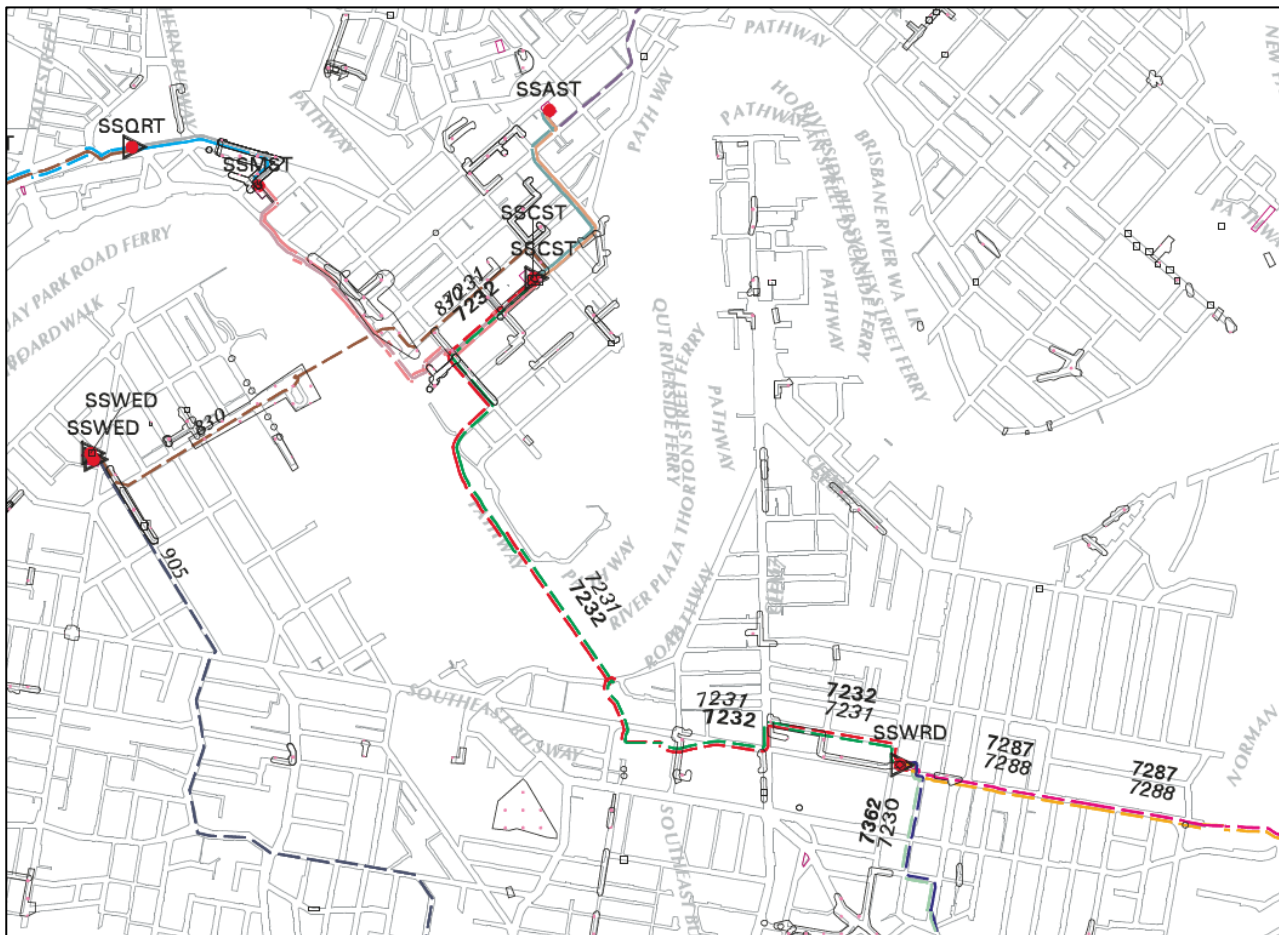


Figure 1: Existing network arrangement (geographic view)

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1.2. Supply System

The main items of plant and equipment that form part of our distribution system in the vicinity of this Project which are relevant to power transfer capability are the Charlotte Street Zone substation (SSCST) and the 11kV feeders.

SSCST supplies this area of the Brisbane CBD via meshed 11 kV underground feeders. It has three 60 MVA, 110/11 kV transformers with dual windings.

The 11 kV network in the area is via mesh network arrangement. Feeder mesh networks consist of multiple feeders from different bus sections of the same substation interconnected through common distribution substations. A mesh network can often lose a single component without losing supply – with the loss of any single feeder; the remaining feeders must be capable of supplying the total load of the mesh. This is per Energex Standards to provide high reliability and security of supply to Brisbane CBD customers. Generally, three diverse routed feeders are installed to form a three feeder mesh from the zone substation to the C&I substation at customer's site if the existing meshes do not have capacity to connect the new load. These feeders will have N-1 redundancy. This network design will allow other new customer to be connected to this mesh network in future.

In a balanced feeder mesh network, each feeder supplies an approximately equal amount of load and has the same rating, as the name describes. Any feeder in a balanced three feeder mesh should be loaded to no more than 67% utilisation under system normal conditions at 50 PoE.

Mesh networks are more common in the Brisbane dense CBD areas where high reliability is critical to allow Energex to meet Distribution Authority reliability performance standards and thus the loss of a single feeder should not affect supply.

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1.3. Load Profiles / Forecasts

The load for the customer connection is commercial in confidence, along with the load profiles and load duration.

The only impact to shared network is the ability to continue to supply other customers from the existing Charlotte Street 110/11 kV substation (SSCST). The total load under the Low, Base and High case load forecast for SSCST, plus the connection load does not exceed the distribution transformer capacity at SSCST. The SSCST forecast and Transformer rating is shown in Table 1.

Table 1 Load Forecast on the SSCST Substation.

Year	SSCST 110/11kV Low Load Forecast (MVA)		SSCST 110/11kV Base Load Forecast (MVA)		SSCST 110/11kV High Load Forecast (MVA)		SSCST Transformer Rating (MVA)
	10POE	50POE	10POE	50POE	10POE	50POE	
2025	82.9	78.4	88.2	86.3	89.7	87.8	189
2026	88.6	84.1	87.0	85.1	89.0	87.1	189
2027	94.3	89.9	93.5	91.7	96.8	94.8	189
2028	97.5	93.2	99.2	97.3	103.5	101.5	189
2029	96.6	92.3	98.8	96.9	104.0	102.1	189
2030	94.6	90.4	98.7	96.9	105.1	103.1	189
2031	82.8	78.8	98.4	96.8	105.8	103.8	189
2032	81.7	77.7	88.5	96.6	96.7	94.7	189
2033	80.5	76.6	88.5	86.7	97.3	95.3	189
2034	79.8	76.0	87.5	86.7	96.9	94.9	189
2035	59.9	75.8	86.9	85.7	96.7	94.7	189

Table 2: Existing SSCST Transformer Utilization

The maximum utilization of the SSCST transformers is 55%.

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2. IDENTIFIED NEED

2.1. Description of the Identified Need

Energex has received a connection application for a major customer to connect a large customer to the network in the Brisbane CBD. The connection arrangement, which has been agreed by, in consultation with the customer, is for a dedicated connection which is composed of both Alternate Control Services (ACS) and Standard Control Services (SCS) as defined in Chapter 10 of the National Electricity Rules (NER).

Works classified as ACS requires that customer fund the cost directly. SCS works are those that are central to the supply of electricity and provided by Energex, including design, construction and operation of the shared network. Cost for these services is recovered through network charges for all relevant customers.

This RIT-D only considers the SCS component, as this is network expenditure, under the identified need.

As a requirement of Energex to provide high reliability and security of supply to Brisbane CBD customers, Energex is planning to install three diverse routed feeders to form a three feeder mesh from Charlotte Street substation to the customer's site in George Street, Brisbane City and establish a C&I substation to supply the customer. These feeders will have N-1 redundancy. This network design will allow other new customer to be connected to this mesh network in future. One of the three feeders has to be installed via Albert Street to connect another large customer. The completion date for the works is October 2027, which is driven by the customer timeframes for connection.

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3. INTERNAL OPTIONS CONSIDERED

3.1. Non-Network Options Identified

Energex has not identified any viable non-network solutions internally that will provide a complete or a hybrid (combined network and non-network) solution to provide the magnitude of network support required in the Brisbane CBD area to address the identified need.

3.2. Network Options Identified

Energex has identified one credible network options that will address the identified need.

3.2.1. Option A: New 11 kV Three Feeder Mesh Network

This option involves supply, design and installation of:

- a) new 11kV switchboard consisting of 3 x Single Feeder CB units and two Feeder CB units for customer supply.
- b) 2 x 110V 32A Battery Charger SC002482917
- c) substation ancillary equipment, including the provision of all substation secondary systems.
- d) approx. 900m 11kV cable (300mm² Cu PLYHDPE) from CB2182 at SSCST to SSBSW via the Western side of Charlotte Street and Eastern side of George Street to form feeder BSWCST18.
- e) approx. 1000m 11kV cable (300mm² Cu PLYHDPE) from CB2212 at SSCST to SSBSW via Edward, Mary, Albert and Margaret Streets to form feeder BSWCST21.
- f) approx. 1400 m 11kV cable (300mm² Cu PLYHDPE) from CB2272 at SSCST to SSBSW via Southern side of Charlotte Street and Northern side of George Street to form feeder BSWCST27.
- g) both the earth ring inside the substation room and the remote earth grid.
- h) multicore cables for all ancillary equipment (excepting transformers), terminate transformer multicores at switchgear end only.
- i) Any civil and electrical works required beyond the frontage of new C&I substation to facilitate the installation of the new 11kV, fibre and pilot cables.
- j) Secondary systems interface works (Protection, SCADA and Communications) inside Energex substations SSBSW and SSCST.
- k) 500m of 15x125 mm² heavy conduits along feeder route.
- l) Terminate of the three (3) new 11kV feeder tails onto the new feeder circuit breakers within new C&I substation and onto existing circuit breakers CB2182, CB2212 & CB2272 at SSCST.
- m) Test and commission of the works at both new C&I substation and SSCST.

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A schematic diagram of the proposed 11 kV network arrangement for Option A is shown below.

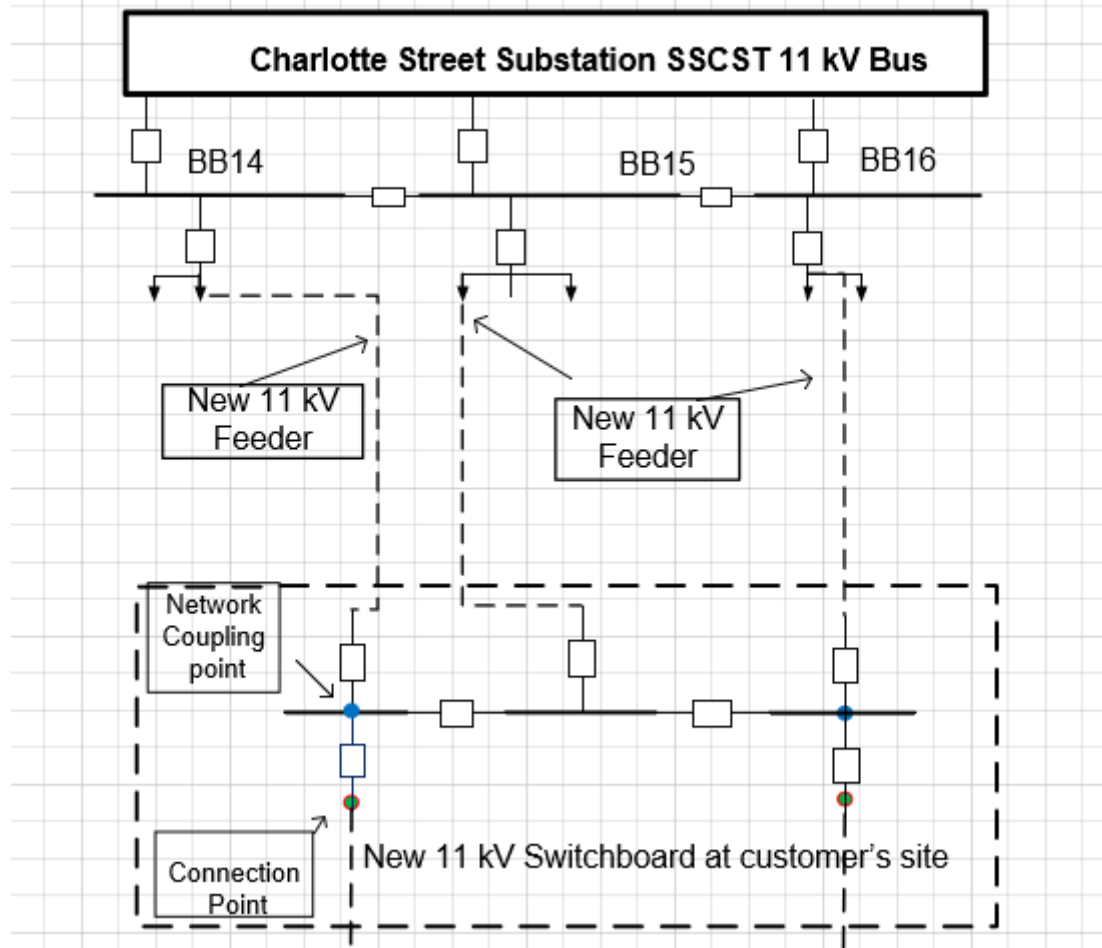


Figure 3: Option A proposed communication network arrangement (schematic view)

3.3. Preferred Network Option

Energex's preferred internal network option is Option A, to install three diverse routed feeders to from Charlotte Street substation to the customer's site in George Street, Brisbane City and establish a C&I substation to supply the customer.

Upon completion of these works, the customer's connection requirements will be addressed and will enable the customer to connect to the Energex Network. The preferred option will provide the greatest reliability and benefit for customers and allow Energex to meet CBD reliability standards as detailed in its Distribution Authority...

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The total estimated capital cost of this option is \$7.663 million. The estimated project delivery timeframe has design commencing towards the end of 2025 and construction completed by October 2027.

4. ASSESSMENT OF NON-NETWORK SOLUTIONS

This project is associated with Energex's customer connections policy. No credible alternative to the Option presented has been deemed as a potential non-network alternative.

Energex's Demand & Energy Management (DEM) team has assessed the potential non-network alternative (NNA) options required to defer the network option and determine that there is no viable demand management (DM) option to replace or reduce the need for the network options proposed, as the entire major load would need to be supplied from an alternate source.

Credible options must be technically and commercially viable and must be able to be implemented in sufficient time to satisfy the identified need.

4.1. Demand Management (Demand Reduction)

In this instance demand reduction is not a viable alternative to a network connection for the major customer and large load. As such no further investigation into demand reduction solutions was pursued.

5. CONCLUSION AND NEXT STEPS

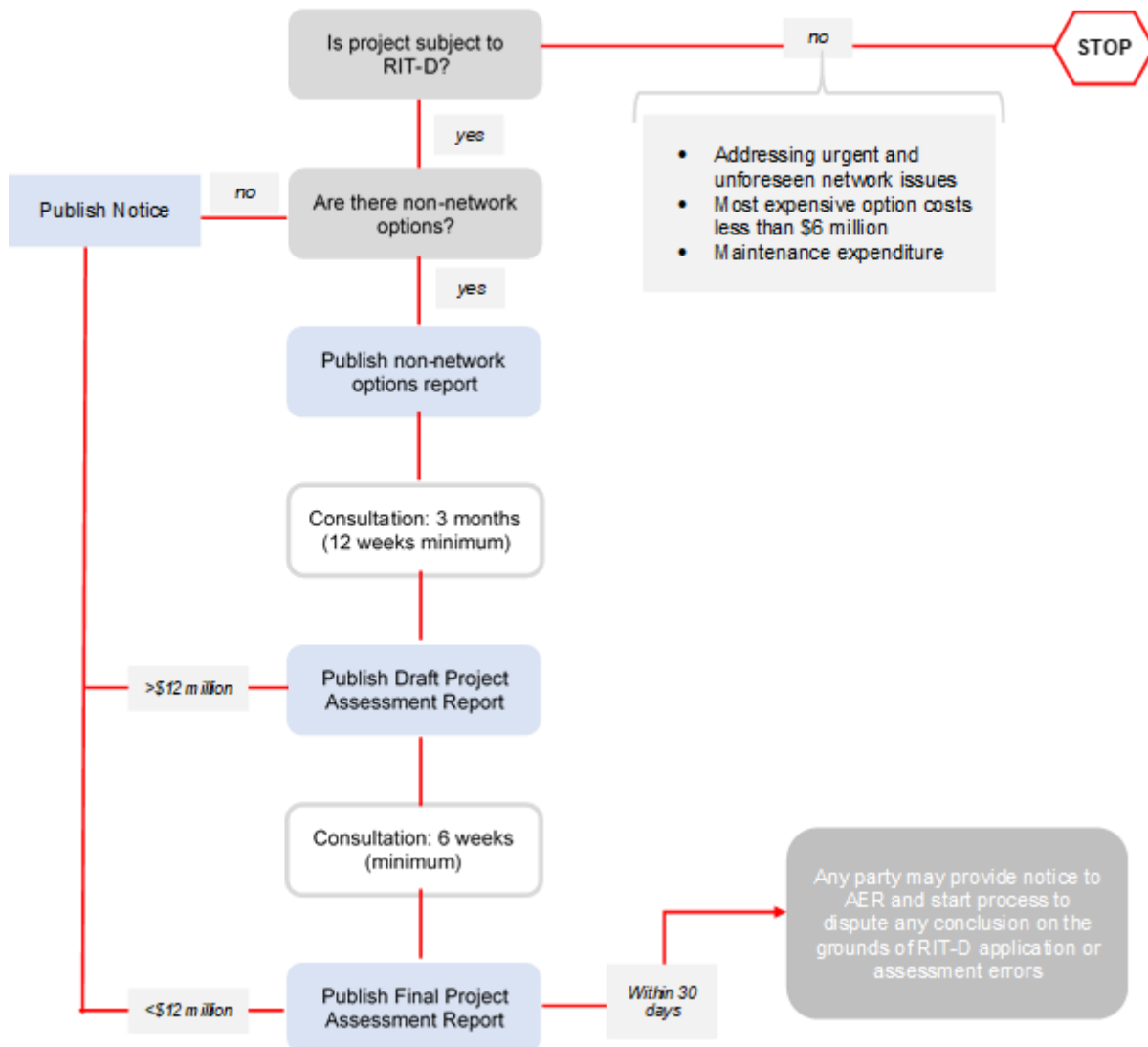
The internal investigations undertaken on the feasibility of the non-network solutions revealed that it is unlikely to find a complete non-network solution or a hybrid (combined network and non-network) solution to provide the magnitude of network support required to address the identified need.

The preferred network option is Option A – New 11 kV Three Feeder Mesh Network. This Notice of No Non-Network Options is therefore published in accordance with rule 5.17.4(d) of the National Electricity Rules. As the next step in the RIT-D process, Energex will now proceed to publish a Final Project Assessment Report.

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APPENDIX A – THE RIT-D PROCESS



Source: AEMC, *Rule determination: National Electricity Amendment (Replacement expenditure planning arrangements) Rule 2017*, July 2017, p. 64.