Regulatory Investment Test for Distribution (RIT-D)

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

Final Project Assessment Report

27 November 2024

energex

Part of Energy Queensland

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 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.

With the connection of a dedicated 4.9 MVA load connection in Brisbane CBD area, 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.

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 Brisbane CBD supply area in a reliable, safe and cost-effective manner. Accordingly, this investment is subject to a RIT-D.

Energex published a Notice of No non-Network options report for the above-described network constraint on 29th October 2024.

One feasible option has been investigated:

- **Option A:** to install three diverse routed feeders from Charlotte Street substation to the customer's site in George Street, Brisbane City and establish a C&I substation as well as installing 11 kV conduits and pits as required to supply the customer.

This Final Project Assessment Report (FPAR), where Energex provides both technical and economic information about possible solutions, has been prepared in accordance with the requirements of clause 5.17.4(o) of the NER.

Energex's preferred solution to address the identified need 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.

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1. INTRODUCTION

This Final Project Assessment Report has been prepared by Energex in accordance with the requirements of clause 5.17.4(o) of the NER.

This report represents the final stage of the consultation process in relation to the application of the RIT-D on potential credible options to address the identified need for the Brisbane CBD network area.

In preparing this RIT-D, Energex is required to consider reasonable future scenarios. With respect to major customer loads and generation, Energex has, in good faith, included as much detail as possible while maintaining necessary customer confidentiality. Potential large future connections that Energex is aware of are in different stages of progress and are subject to change (including outcomes where none or all proceed). These and other customer activity can occur over the consultation period and may change the timing and/or scope of any proposed solutions.

1.1. Response to the DPAR

Energex published a Notice of No non-Network options report for the above-described network constraint on 29th October 2024.

1.2. Structure of the Report

This report:

- Provides background information on the network capability limitations of the distribution network supplying the Brisbane CBD area.
- Identifies the need which Energex is seeking to address, together with the assumptions used in identifying and quantifying that need.
- Describes the credible options that are considered in this RIT-D assessment.
- Quantifies costs and classes of material market benefits for each of the credible options.
- Describes the methods used in quantifying each class of market benefit.
- Provides details of classes of market benefits that are not considered material to this RIT-D assessment and provides explanations as to why these classes of market benefits are not considered material.
- Provides the results of Net Present Value (NPV) analysis of each credible option and accompanying explanatory statements regarding the results.
- Identifies the proposed preferred option, including detailed characteristics, estimated commissioning date, indicative costs, and noting that it satisfies the RIT-D.
- Provides contact details for queries on this RIT-D.

1.3. Dispute Resolution Process

In accordance with the provisions set out in clause 5.17.5(a) of the NER, Registered Participants or Interested Parties may, within 30 days after the publication of this report, dispute the conclusions made by Energex in this report with the Australian Energy Regulator. Accordingly, Registered Participants and Interested Parties who wish to dispute the conclusions outlined in this report based on a manifest error in the calculations or application of the RIT-D must do so within 30 days of the publication date of this report. Any parties raising a dispute are also required to notify Energex. Dispute notifications should be sent to demandmanagement@energex.com.au

If no formal dispute is raised, Energex will proceed with the preferred option to install three 11 kV feeders from Charlotte Street substation to the customer's site in George Street, Brisbane City and establish a C&I substation to supply the customer.

Contact Details

For further information and inquiries please contact:

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2. BACKGROUND

2.1. Geographic Region

The 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 numerous options presented, with connection to the 11kV network being the preferred solution. The geographical location of Energex's sub-transmission network and substations in the area is shown in Figure 1.

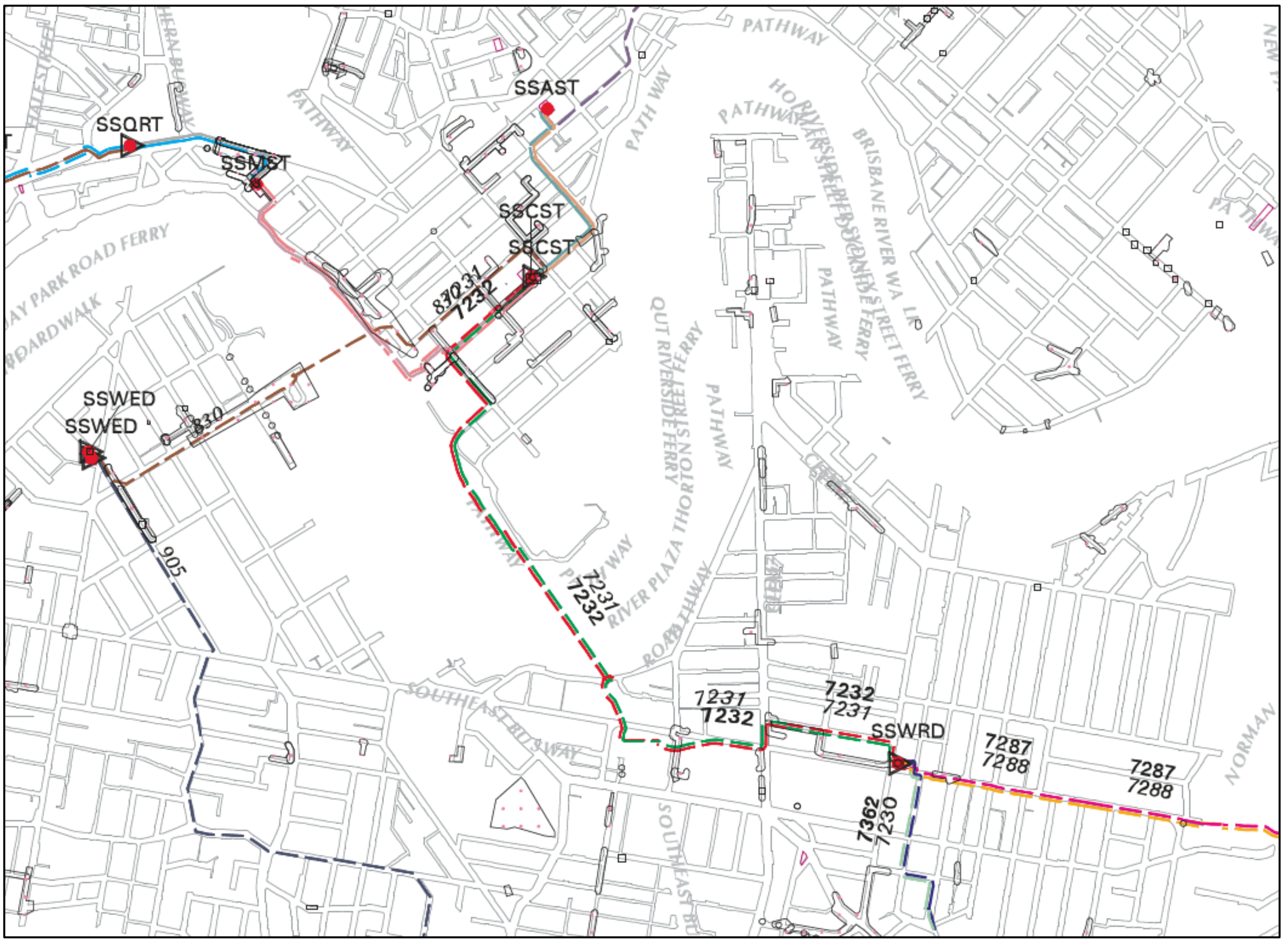


Figure 1: Existing network arrangement (geographic view)

The geographical location of Energex's 11 kV distribution network and substations in the area is shown below.

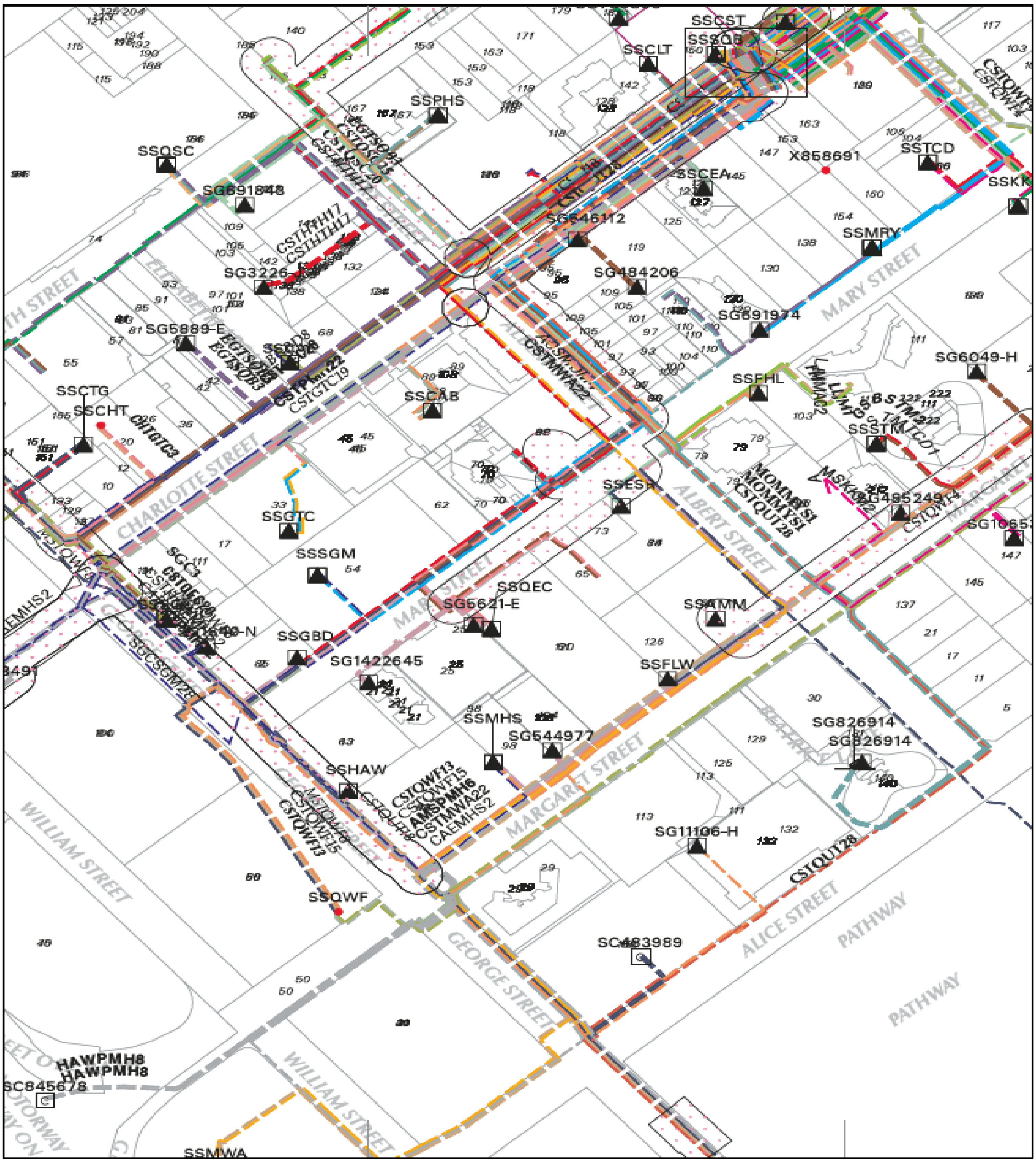


Figure 2 - 11kV Distribution Network Surrounding in George Street

2.2. Existing 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.

The 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.

The Charlotte Street 110/11kV Substation contains three (3) 60MVA transformers with dual windings. It provides electricity to approximately 2713 customers via 11 kV feeders in the area south of Brisbane City's Queen Street Mall. Majority of these loads are high rise commercial buildings, residential buildings or a mixture of these. These loads include The Queensland Parliament House, The Queensland University of Technology, Queens Wharf Development, Queensland Government buildings/premises, shopping malls and hotels.

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 customers 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.

A schematic view of the existing distribution network arrangement is shown in Figure 3 below.

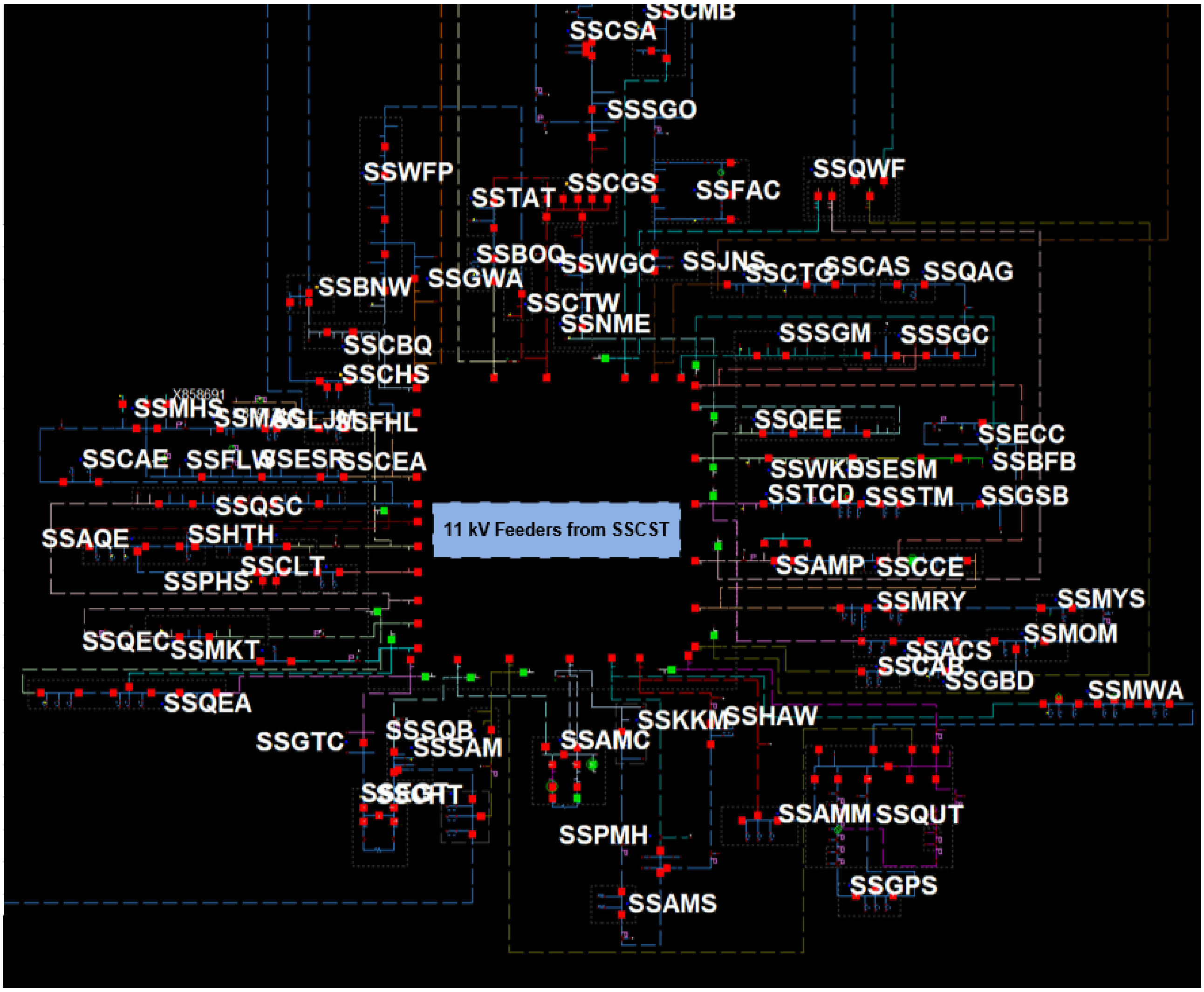


Figure 3: Existing network arrangement (schematic view)

The new supply for this customer is required in George Street, Brisbane City. There are no existing 11 kV feeders with 4.9 MVA capacity in front of or close to this site to connect this new load. The existing three feeder and four feeder meshes are close to this site. The loadings of these meshes are listed in Table 3.

2.3. 11kV Feeder Rating

The ratings of the existing 11kV feeders of the three feeder meshes near the development sites are shown in the following table:

Feeder	Type / Size	Rating	SD	SN	WD	WN
CSTKKM1 (3 fdr mesh 1)	CBD UG 185 3C Cu	User	280	280	280	280
CSTPMH22 (3 fdr mesh 1)	CBD UG 185 3C Cu	User	280	280	280	280
CSTHAW26 (3 fdr mesh 1)	CBD UG 185 3C Cu	User	280	280	280	280
CABCST13 (3 fdr mesh 2)	CBD UG 185 3C Cu	User	280	280	280	280
ACSCST3 (3 fdr mesh 2)	CBD UG 185 3C Cu	User	280	280	280	280
CSTMRY3 (3 fdr mesh 2)	CBD UG 300 3C Cu	User	380	380	380	380
AMMCST26 (4 fdr mesh 1)	CBD UG 300 3C Cu	User	380	380	380	380
CSTMWA26 (4 fdr mesh 1)	CBD UG 300 3C Cu	User	380	380	380	380
CSTQUT18 (4 fdr mesh 1)	CBD UG 300 3C Cu	User	380	380	380	380
CSTQUT28 (4 fdr mesh 1)	CBD UG 300 3C Cu	User	380	380	380	380

Table 1 – Existing 11kV Feeder Ratings

As outlined in the table above, the rating of the existing three feeder meshes are limited by 185mm^2 3 core copper underground cables.

2.4. DMS Limits

The existing DMS limits are shown in the following table:

Substation / Feeder	CB / Tx NPR	FSD	CT		Prot'n	2HE	
			Meter	Prot	(* 0.9)	Sum	Win
CSTKKM1 (3 fdr mesh 1)	1250	800	400	600	540	280	280
CSTPMH22 (3 fdr mesh 1)	1250	800	400	600	540	280	280
CSTHAW26 (3 fdr mesh 1)	1250	800	400	600	540	280	280
CABCST13 (3 fdr mesh 2)	1250	800	400	600	540	360	360
ACSCST3 (3 fdr mesh 2)	1250	800	400	600	540	360	360
CSTMRY3 (3 fdr mesh 2)	1250	800	400	600	540	360	360
AMMCST26 (4 fdr mesh 1)	1250	800	400	600	540	280	280
CSTMWA26 (4 fdr mesh 1))	1250	800	400	600	540	280	280
CSTQUT18 (4 fdr mesh 1)	1250	800	400	600	540	280	280
CSTQUT28 (4 fdr mesh 1)	1250	800	400	600	540	280	280

Table 2 – Existing DMS Limits

As outlined in the table above, the analysis indicates that the secondary systems are not a limitation.

2.5. 11kV Feeder Utilisation

The summer 2023/24 10% POE load of the existing 11kV feeders (without block load on each Mesh) on the three feeder meshes near the development sites, along with the existing normal cyclic ratings and calculated feeder utilisations, are shown in the table below:

The new supply for this customer is required in George Street, Brisbane City. There are no existing 11 kV feeders with 4.9 MVA capacity in front of or close to this site to connect this new load. The existing two three feeder meshes as well as one four feeder mesh are close to this site. The loadings of these meshes are list below.

The major customers on 3 feeder mesh 1 are high rise commercial and residential buildings. It has a N-1 utilisation of 42%.

The major customers on 3 feeder mesh 2 are high rise commercial and residential buildings. It has a N-1 utilisation of 50%.

The major customers on 4 feeder mesh 1 are high rise commercial and residential buildings. It has a N-1 utilisation of 66%.

The table below shows the utilisation on the feeders with 2023/24 loads as well as highest utilisation of the remaining feeder for the loss of a feeder in the mesh.

Mesh Name	Total Mesh Load (A), Individual feeder load	N-1 utilisation for the loss of a feeder based on emergency rating
3 fdr mesh 1	210 A (93A - 33%, 68A - 24%, 49A - 17%)	42%
3 fdr mesh 2	292 A (74A - 26%, 114A - 41%, 104A – 37%)	50%
4 fdr mesh 1	595 A (140A - 39%, 98A - 27%, 200A – 56%, 157A - 43%)	66%

Table 3 – Surrounding Mesh Load in 2023/24 without New Load

This new load of 4.9 MVA cannot be connected to any of the existing meshes as it would overload the remaining feeder(s) for the loss of a faulty feeder.
Thus, a new three feeder mesh has to be established to supply this new load.

2.6. Load Profiles / Forecasts

2.6.1. Full Annual Load Profile

The full annual load profile for Charlotte Street Substation over the 2023/24 financial year is shown in Figure 4. It can be noted that the peak load occurs during summer.

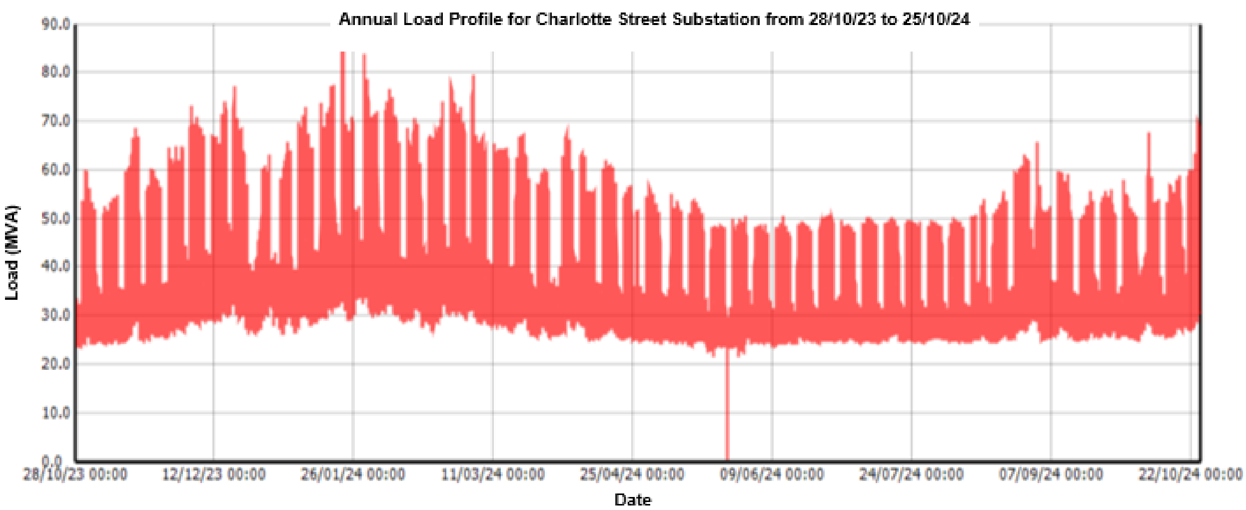


Figure 2: Substation actual annual load profile

2.6.2. Average Peak Weekday and Weekend Load Profile (Summer)

The daily load profile for an average peak weekday during summer is illustrated below in Figure 5. It can be noted that the summer peak loads at Charlotte Street Substation are historically experienced in the day to early evening.

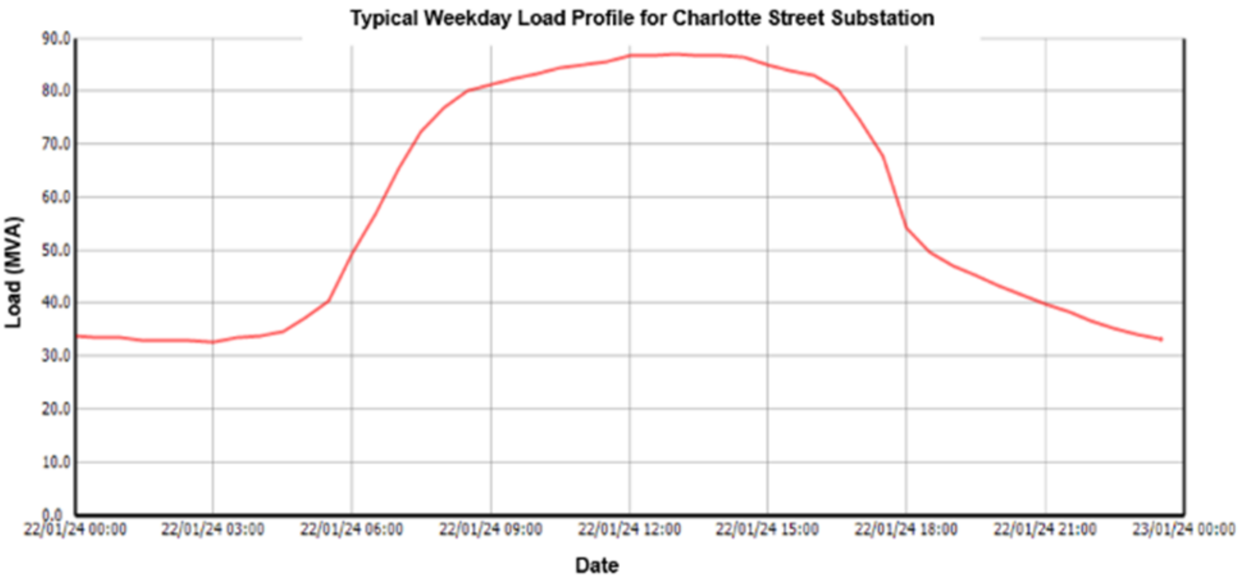


Figure 5: Substation average peak weekday load profile (summer)

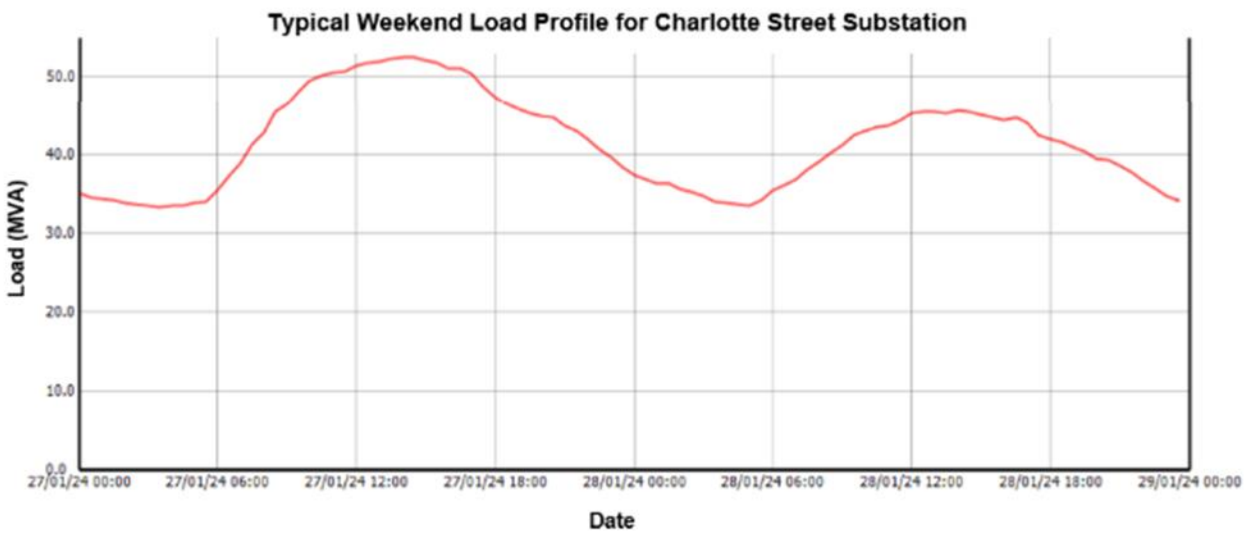


Figure 6: Substation average peak weekend load profile (summer)

3. IDENTIFIED NEED

3.1. Description of the Identified Need

As part of a major load connection in the Brisbane CBD area a project has been initiated which includes both ACS and SCS cost components. This RIT-D covers the identified need pertaining to the SCS component of the cost.

3.1.1. Connection of a Large Customer Load

Energex has received a connection application for a major customer to connect new load 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.

3.2. Quantification of the Identified Need

3.2.1. New High Rise Buildings

Presently higher growth is being experienced in this area of Brisbane CBD, partly due to Brisbane Olympics in 2032. The growth in the area is primarily driven by high rise residential and commercial developments with maximum of 90 storey buildings.

The maximum target utilisation of 67% will be exceeded on any of the three-feeder meshes or 75% on the four-feeder mesh if this new load of 4.9 MVA is connected to any of the existing feeders.

3.2.2. Reliability and Network Security

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.

Site-specific reliability figures have not been provided at this time. Such information can be requested, but figures provided can only be considered as a general potential guide to the future as past performances will be based on the specific circumstances present at the relevant time, which may or may not provide any indication as to future performances.

In particular, you should note that a range of factors can influence the reliability of electrical infrastructure, including (but not limited to) environmental factors which vary from year to year (such as significant weather events including cyclones, bushfires and flooding).

11kV feeders have minimum service standards target. As a guide, once the three 11 kV feeders constructed to supply this customer, will have a reliability classification of "CBD", which corresponds to the SAIDI and SAIFI minimum service standards shown in Tables below. Further details about minimum service standards are available at the following webpage. https://www.business.qld.gov.au/industries/mining-energy-water/energy/electricity/regulation-licensing/minimum-standards

1. SAIDI or System Average Interruption Duration Index, means the sum of the durations of all the sustained interruptions (in minutes), divided by the customer base. Momentary interruptions (of three minutes or less) are excluded from the calculation of unplanned SAIDI.

   SAIDI limits (minutes per customer)

Feeder Type	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25
CBD	15	15	15	15	15	15
Urban	106	106	106	106	106	106
Short Rural	218	218	218	218	218	218

Table 4 – Energex Minimum Service Standards - SAIDI

2. SAIFI or System Average Interruption Frequency Index, means the total number of sustained interruptions, divided by the customer base. Momentary interruptions (of three minutes or less) are excluded from the calculation of unplanned SAIFI.

   SAIFI limits (interruptions per customer)

Feeder Type	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25
CBD	0.15	0.15	0.15	0.15	0.15	0.15
Urban	1.26	1.26	1.26	1.26	1.26	1.26
Short Rural	2.46	2.46	2.46	2.46	2.46	2.46

Table 5 – Energex Minimum Service Standards- SAIFI

3.3. Assumptions in Relation to Identified Need

Below is a summary of key assumptions that have been made when the identified need has been analysed and quantified.

It is recognised that the below assumptions may prove to have various levels of correctness, and they merely represent a 'best endeavours' approach to predict the future identified need.

3.3.1. Large Load Connection

The following items were considered when working through the customer enquiry:

- In consultation with the connecting customer only the 11kV option was pursued.

- Brisbane CBD reliability and security of supply requirements
- Staged approach to construction and supply to maximise existing network
- known future developments (new major customers, network augmentation, etc.

4. CREDIBLE OPTION ASSESSED

4.1. Assessment of Network Solutions

Energex has identified 1 credible network option that will address the identified need.

4.1.1. Option A: Establish a New Three Feeder Mesh and C&I Substation

This option involves installing three new diverse routed 11 kV feeders from SSCST to a new C&I substation, (SSBWS), at the customer's site at in George Street and supplying the customer with two 11 kV feeders from SSBWS. The works will include installation, testing and commissioning of the new 11 kV cables, new C&I substation, (SSBWS) with protection relays, secondary systems interfaced works and multicore cables as well as installing 11 kV conduits and pits as required in order to address the identified need.

A schematic diagram of the proposed network arrangement for Option A is shown in Figure 7.

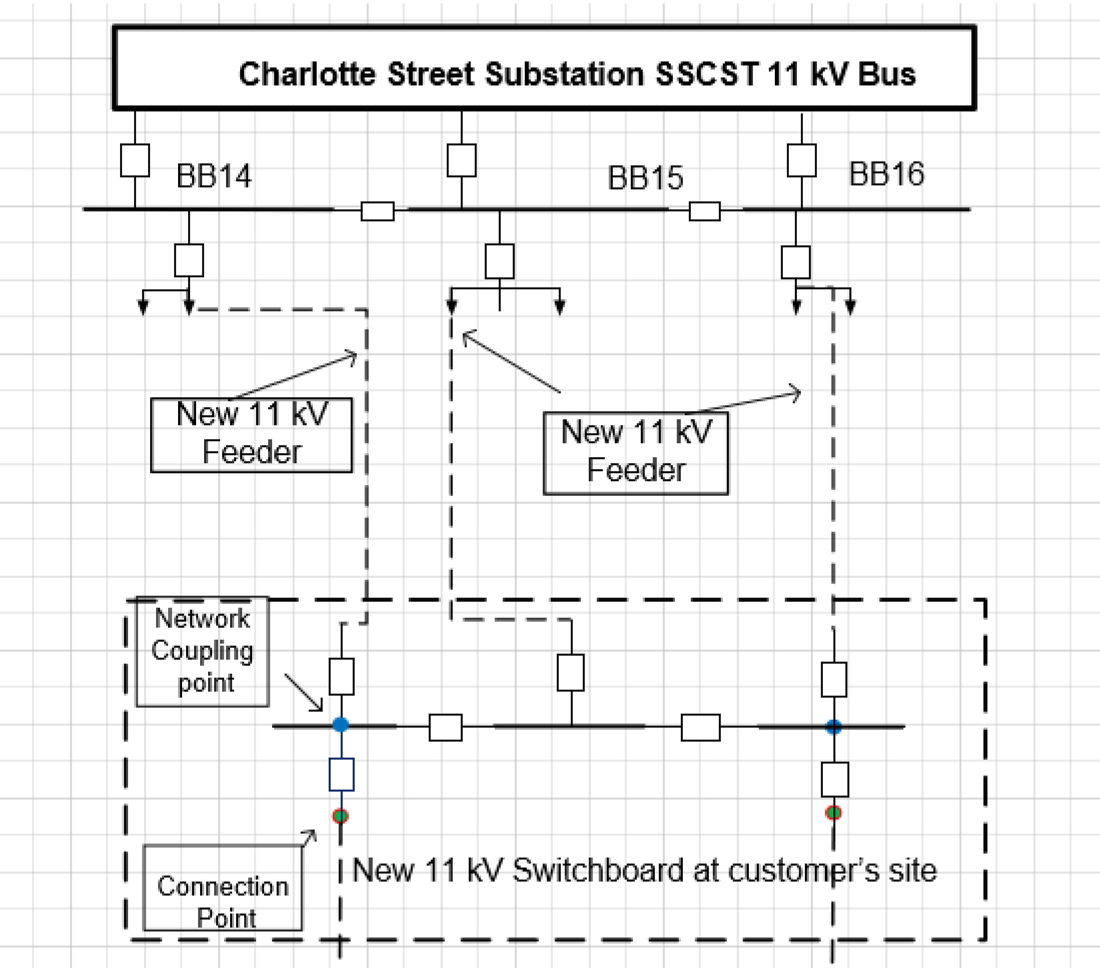


Figure 7: Option A proposed network arrangement (schematic view)

4.2. Assessment of SAPS and Non-Network Solutions

Energex has considered Standalone Power Systems (SAPS) and demand management solutions to determine their feasibility to meet the identified need. Each of these are considered below.

4.2.1. Consideration of SAPS Options

Energex considers there is no SAPS option that could form a potential credible option on a standalone basis, or that could form a significant part of the credible option. In particular the load requirements, per the forecast in the Brisbane CBD could not be supported by a network that is not part of the interconnected national electricity system.

4.2.2. Demand Management (Demand Reduction)

Energex's Demand & Energy Management (DEM) team has assessed the potential non network alternative (NNA) options required to defer the network option and determine if there is a viable demand management (DM) option to replace or reduce the need for the network options proposed.

Credible options must be technically and commercially viable and must be able to be implemented in sufficient time to satisfy the identified risk to the public and/or the network due to the identified constraints.

The DEM team has completed a review of the Brisbane CBD customer base and considered a number of demand management technologies. Asset safety and performance risks are the key project drivers (i.e. the need) in Brisbane CBD. It has been determined that most demand management options will not be viable propositions and have been explored in the following sections.

Network Load Control

The Brisbane CBD loads are mainly high rise commercial and residential and have no load controlling mechanism.

Therefore, network load control would not sufficiently address the identified need.

4.2.3. Demand Response

Four methods utilising demand response technology for deferring network investment are: Call Off Load (COL), Customer Embedded Generation (CEG), Large Scale Customer Generation (LSG) and customer solar power systems.

Customer Call Off Load (COL)

COL is an effective technique for deferring network investment where the need is for a short time period. However, in this instance, the need is required on a long-term permanent basis. There are a small number of large customers in the catchment area but the $/kVA funding available for demand reduction is low therefore customer call off load has been assessed as not a viable proposition as it will not address the identified need, nor benefit the community.

Customer Embedded Generation (CEG)

CEG is an effective technique for deferring network investment where the need is for a short time period. The primary driver for investment in this instance is asset safety and performance. A short-term deferral of network investment by using CEG is not a technically or financially feasible option (due to the number of contracts required to be negotiated and managed).

This option has been assessed as technically not viable as it will not address the identified network requirement.

Large-Scale Customer Generation (LSG)

LSG sites such as renewable energy generation, solar or wind farms of multiple MW's capacity constitute an opportunity to support substation investment by reducing demand on, and potentially providing reactive power support for substation assets.

This option could potentially address the identified need, however, has been assessed as technically not viable as there is no known existing or proposed LSG demand response available.

Customer Solar Power Systems

A total of 3 customers has solar photo voltaic (PV) systems for a connected inverter capacity of 1,375kVA in this area of Brisbane CBD and their maximum demand is greater than 6 MVA. Thus other customers PV system cannot support this load.

The daily peak demand is driven by commercial and residential customer demand and the peak

Business customers with large solar arrays are deemed to present a significant opportunity for targeted load control or load curtailment if coupled with a Battery Energy Storage System (BESS). Contracting such customers is attractive as they represent a larger load across a fewer customers and therefore are cheaper and easier to engage and contract.

However, only a small percentage of customers in this supply area have solar PV systems and none have a BESS. PV systems with BESS present a future portfolio opportunity for potential demand response.

SAPS and Non-Network Solution Summary

Energex has not identified any viable SAPS or 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 Brisbane CBD area to address the identified need.

4.3. Preferred Network Option

Energex's preferred internal network option is Option A, to install three new diverse routed 11 kV feeders from SSCST to a new C&I substation, at the customer's site in George Street. The works will include installation, testing and commissioning of the new 11 kV cables, new C&I substation, with protection relays, secondary systems interfaced works and multicore cables in order to address the identified need.

A schematic diagram of the proposed network arrangement for Option A is shown in Figure 11.

Upon completion of these works, the connection of new major customer load at Brisbane CBD will be addressed. The preferred option will provide the greatest reliability benefit for customers, whilst also reducing expenditure on obsolete and non-compliant assets while ensuring more efficient use of design and construction resources.

The estimated capital cost of this option inclusive of interest, risk, contingencies and overheads is $7.663 million. The estimated project delivery timeframe has design commencing at the end of 2025 and construction completed by October 2027.

5. MARKET BENEFIT ASSESSMENT METHODOLOGY

The purpose of the RIT-D is to identify the option that maximises the present value of net market benefits to all those who produce, consume and transport electricity in the National Electricity Market (NEM).

In order to measure the increase in net market benefit, Energex has analysed the classes of market benefits required to be considered by the RIT-D.

5.1. Classes of Market Benefits Considered

No classes of market benefits are considered material, and have not been included in this RIT-D assessment (refer section 5.2).

5.2. Classes of Market Benefits not Expected to be Material

The following classes of market benefits are not considered to be material for this RIT-D, and have not been included in this RIT-D assessment:

- Changes in voluntary load shedding and Customer interruptions caused by Network Outages
- Changes in voluntary load curtailment
- Changes in costs to other parties
- Differences in timing of expenditure
- Changes in load transfer capacity and the capacity of Embedded Generators to take up load
- Changes in network losses
- Option value
- Other Classes of Market Benefit

5.2.1. Changes in Voluntary Load Curtailment

The credible options presented in this RIT-D assessment do not include any voluntary load curtailment as there are no customers on voluntary load curtailment agreements in the [insert location here] area. Therefore, market benefits associated with changes in voluntary load curtailment have not been considered.

5.2.2. Changes in Costs to Other Parties

Energex does not anticipate that any of the credible options included in this RIT-D assessment will affect costs incurred by other parties.

5.2.3. Differences in Timing of Expenditure

The credible options included in this RIT-D assessment is/are not expected to affect the timing of other distribution investments for unrelated identified needs.

5.2.4. Changes in Load Transfer Capacity and the capacity of Embedded Generators to take up load

The credible options included in this RIT-D assessment are not expected to have an impact on the load transfer capacity or the capacity of embedded generators to take up load between the zone substations in the Brisbane CBD area.

5.2.5. Changes in Network Losses

Energex does not anticipate that any of the credible options included in the RIT-D assessment will lead to any significant change in network losses.

5.2.6. Option Value

The AER's view is that option value is likely to arise where there is uncertainty regarding future outcomes, the information that is available in the future is likely to change, and the credible options considered by the RIT-D proponent are sufficiently flexible to respond to that change[1].

Energex does not consider that the identified need for the options included in this RIT-D would be affected by uncertain factors about which there may be more clarity in future.

5.2.7. Other Class of Market Benefit

Energex has not identified any other relevant class of market benefit for this RIT-D.

6. DETAILED ECONOMIC ASSESSMENT

6.1. Methodology

The Regulatory Investment Test for Distribution requires Energex to identify the credible option that maximises the present value of net economic benefit to all who produce, consume and transport electricity in the National Electricity Market.

[1] AER "Regulatory Investment Test for Distribution Application Guidelines", Section A6.
Available at: http://www.aer.gov.au/networks-pipelines/guidelines-schemes-models-reviews/regulatory-investment-test-for-distribution-rit-d-and-application-guidelines

Accordingly, a base case Net Present Value (NPV) comparison of the alternative development options has been undertaken. A sensitivity analysis was then conducted on this base case to establish the option that remained the lowest cost option in the scenarios considered.

Further to the scenarios considered, a Monte-Carlo analysis simulation was undertaken on the base case project timings to assess the projects sensitivity to a change in the parameters of the NPV model.

6.2. Key Variables and Assumptions

The economic assessment contains anticipated costs of providing, operating and maintaining the options as well as expected costs of compliance and administration associated with each option.

The present value comparison summary includes all costs directly associated with constructing and providing the option. This includes the cost of land and easements currently owned or to be acquired for network augmentation.

Interest on borrowings is not included as a cost in the comparison of options as it represents a cost of project financing, and as such is accounted for in present value calculations through the discounting of the project cash flows at the regulated WACC. The interest on borrowings is included in the Total Project Cost for which approval is being sought as it represents a legitimate cost of network augmentation.

6.3. Scenarios Adopted for Sensitivity Testing

No sensitivity analysis was conducted based on the forecast load as this has no bearing on the benefits, cost or options presented.

6.4. Net Present Value (NPV) Results

An overview of the initial capital cost and the base case NPV results are provided in Table .

Option	Option Name	Rank	Initial Capital Cost	Net Economic Benefit ($ real)	PV of Capex ($ real)	PV of Opex ($ real)
A	Install thee 11 kV cables, Establish C&I Substation, Install conduits and pits, etc	1	$7,663,468	-$7,291,000	-$7,183,000	-$108,000

Table 6: Base case NPV ranking table

Based on the economic assessment, Option A is considered to provide the optimum solution to address the forecast limitations and is therefore the recommended development option.

7. CONCLUSION

The Final Project Assessment Report (FPAR) represents the final stage of the consultation process in relation to the application of the RIT-D.

Energex intends to take steps to progress the proposed preferred option to ensure any statutory non-compliance is addressed and undertake appropriately justified network reliability improvements, as necessary.

7.1. Preferred Option

Energex's preferred option is Option A is installing three new diverse routed 11 kV feeders from SSCST to a new C&I substation at the customer's site in George Street and supplying the customer with two 11 kV feeders from this C&I substation. The works will include installation, testing and commissioning of the new 11 kV cables, new C&I substation with protection relays, secondary systems interfaced works and multicore cables as well as installing 11 kV conduits and pits as required.

The estimated capital cost of this option inclusive of interest, risk, contingencies and overheads is $7.663 million. Annual operating and maintenance costs are anticipated to be 0.5% of the capital cost. The estimated project delivery timeframe has design commencing at the end of 2025 and construction completed by October 2027.

7.2. Satisfaction of RIT-D

The proposed preferred option satisfies the RIT-D.

This statement is made on the basis of the detailed analysis set out in this report. The proposed preferred option is the credible option that has the highest net economic benefit under the most likely reasonable scenarios.

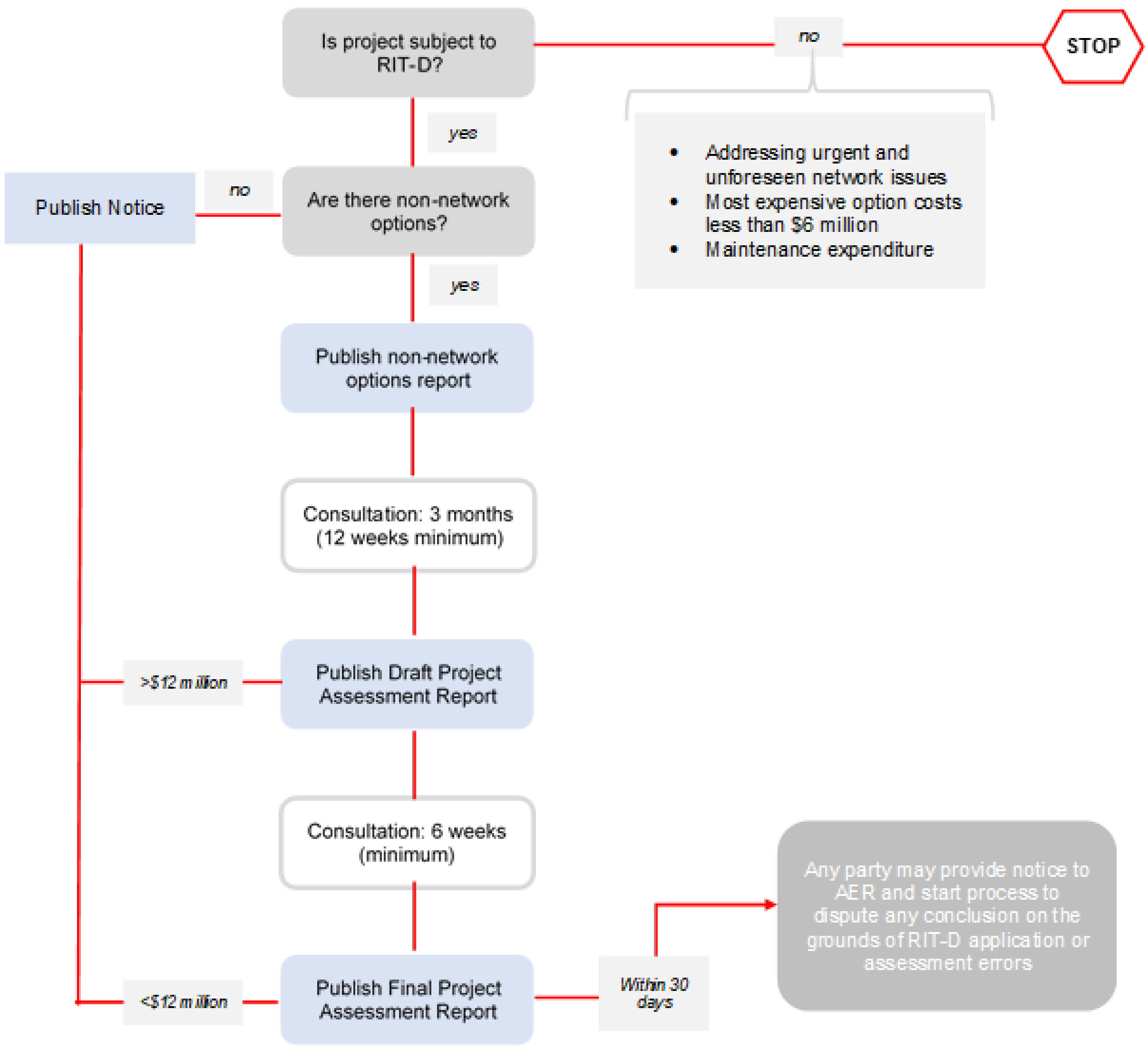
8. COMPLIANCE STATEMENT

This Final Project Assessment Report complies with the requirements of NER section 5.17.4(j) as demonstrated below:

Requirement	Report Section
(1) a description of the identified need for investment;	3
(2) the assumptions used in identifying the identified need (including, in the case of proposed reliability corrective action, why the RIT-D proponent considers reliability corrective action is necessary;	3.3
(3) if applicable, a summary of, and commentary on, the submissions received on the DPAR;	N/A
(4) a description of each credible option assessed	4
(5) where a *Distribution Network Service Provider* has quantified market benefits in accordance with clause 5.17.1(d), a quantification of each applicable market benefit of each credible option	5
(6) a quantification of each applicable cost for each credible option, including a breakdown of operating and capital expenditure	3.2

(7) a detailed description of the methodologies used in quantifying each class of costs or market benefit	5
(8) where relevant, the reasons why the RIT-D proponent has determined that a class or classes of market benefits or costs do not apply to a credible option	5.2
(9) the results of a NPV analysis of each credible option and accompanying explanatory statements regarding the results	6.4
(10) the identification of the proposed preferred option	7.1
(11) for the proposed preferred option, the RIT-D proponent must provide: (i) details of the technical characteristics; (ii) the estimated construction timetable and commissioning date (where relevant); (ii) the indicative capital and operating costs (where relevant); (iv) a statement and accompanying analysis that the proposed preferred option satisfied the RIT-D; and (v) if the proposed preferred option is for reliability corrective action and that option has a proponent, the name of the proponent	7.1 & 7.2
(12) contact details for a suitably qualified staff member of the RIT-D proponent to whom queries on the final report may be directed.	1.4

APPENDIX A – THE RIT-D PROCESS



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