Regulatory Investment Test for Distribution (RIT-D)

Reliability Corrective Action in
The West End Network Area

Notice of No Non-Network or SAPS Options

20 May 2026

energex
Part of Energy Queensland

Relaibility Corrective Action in the West End Network Area
Notice of No Non-network or SAPS Options

INTRODUCTION

Purpose

Energex Limited (Energex) has determined on reasonable grounds, in accordance with clause 5.17.4(c) of the National Electricity Rules (NER), that there is no non-network option or a stand-alone power-system (SAPS) option that is a potential credible option, or that forms a significant part of a potential credible option, for this RIT-D project to address the identified need.

This notice sets out the reasons and any methodologies and assumptions used in making this determination. Energex publishes this notice in accordance with clause 5.17.4(d) of the NER.

About Energex

Energex Limited (Energex) is a subsidiary of Energy Queensland Limited and manages the electricity distribution network in the growing region of South-East 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 57,000 kilometres of powerlines and 450,000 power poles, along with associated infrastructure such as major substations and power transformers.

Today, we provide distribution services to more than 1.5 million domestic and business connections, delivering electricity to a population base of around 4 million people.

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1 ASSUMPTIONS AND TECHNICAL CHARACTERISTICS OF THE IDENTIFIED NEED

1.1 Existing supply arrangement

1.1.1 Geographic Region

West End 110/11kV zone substation (SSWED) is located approximately 1.5 km South-West of Brisbane CBD. It provides electricity supply to approximately 9,400 customers in the inner Brisbane suburbs of West End, South Brisbane and Highgate Hill. There is a mixture of commercial, industrial and residential customers serviced by the substation. SSWED supplies approximately 270 GWh of energy annually, with approximately 11% of the energy consumed by residential customers.

The geographical location of Energex's sub-transmission network and substations in the area is shown in Figure 1.

Figure 1: Existing SSWED network arrangement (geographic view)

1.1.2 Overview of Existing System

SSWED is equipped with two 60 MVA, 110/11kV transformers, 110kV indoor switchgear with a single 110kV CB and 11kV indoor switchgear with four buses. SSWED is supplied via 110kV feeders F905 (from Powerlink's Rocklea Substation SSH16) and F830 (from the Charlotte Street Zone Substation SSCST).

SSWED has four 11kV buses with TR3 supplying BB13 and BB16, and TR4 supplying BB14 and BB15. There are automatic change over (ACO) schemes for bus section CBs between BB13 and BB14 and between BB15 and BB16. There is an ongoing project at SSWED to refurbish the switchgear on one 11kV bus.

A schematic view of the existing sub-transmission network arrangement is shown in Figure 2.

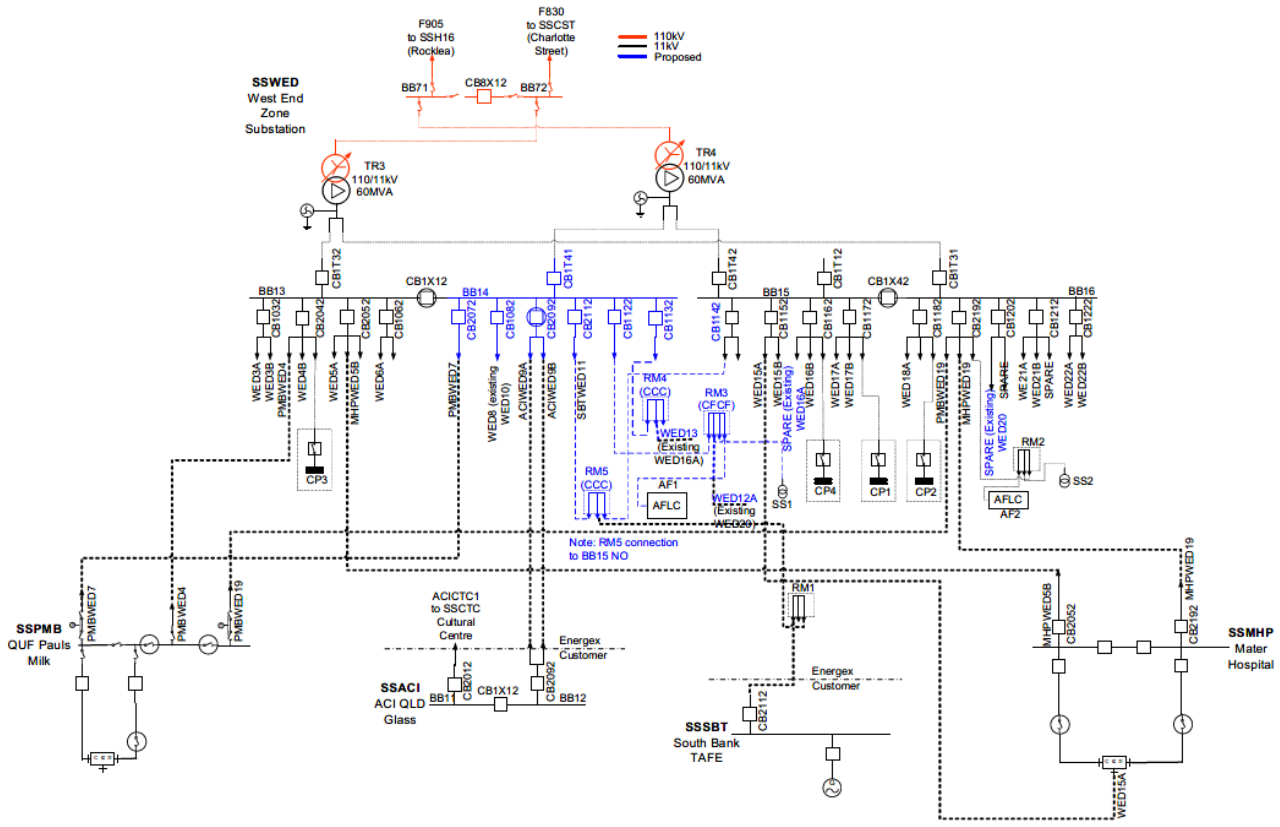

Figure 2: Existing network arrangement with in-progress refurbishment works

1.2 Size of load reduction or additional supply

To meet Energex's ongoing operational needs, any alternate solution must provide capacity or demand reduction to the distribution network up to 12MVA in 2032, increasing to 19.1MVA in 2035. This support must be available at short notice when called upon. The periods where this support may be required is from October to April of the following year, except for 2032 where this support must be made available for the full calendar year. Table 1 below summarises the forecast duration of network support required as measured at the SSWED 11kV bus.

Year	Max Load at risk (MVA)	Yearly		Peak Day	
		Energy at risk (MWh)	Number of hours at risk	Energy at risk (MWh)	Number of hours at risk
2030/31	11.2	151	38.5	49	8
2031/32	12.0	184	48	55	8
2032/33	17.1	575	142.5	100	10.5
2033/24	17.7	654	160	106	11
2034/35	18.2	727	179.5	111	11.5
2035/36	19.1	862	206	119	11.5

Table 1: Forecast size of load reduction or additional supply

1.3 Location

Whilst the location where network support will be measured / referenced is on the 11kV bus at SSWED, the support may be located downstream of the reference buses.

1.4 Contribution to power system security or reliability

The solution must enable Energex to maintain a level of security that complies with the service safety net targets required under its Distribution Authority, which has specific outage restoration timeframe targets that Energex is required to achieve. SSWED is classified as “Urban” under the safety net. Details of the safety net targets are shown in Appendix A.

Energex is unable to comply with the safety net targets when load is above 66MVA. Network support is required to keep the load supplied by SSWED below this level. The proposed solution must have a high level of reliability to be available for the full durations when called upon.

1.5 Contribution to power system fault levels

The solution must consider the fault level contribution to the network and include any mitigation works that are required due to a change in fault level. The maximum fault level on the 11kV network should not exceed 13.1kA.

1.6 Operating profile

Full Annual Load Profile

The full annual load profile for SSWED over 2025 is shown in Figure 3. It can be noted that the peak load occurs during summer.

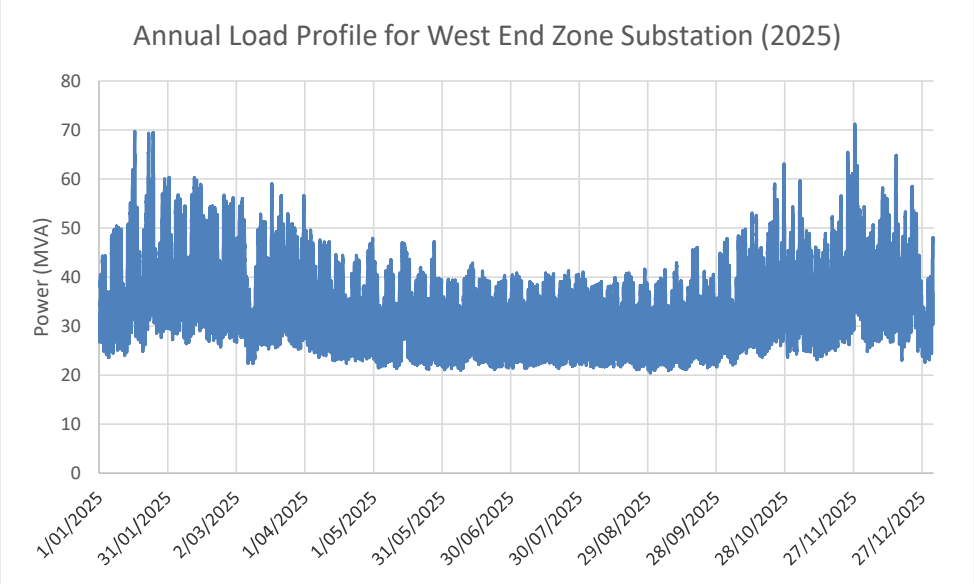

Figure 3: Substation actual annual load profile

Load Duration Curve

The load duration curve for SSWED in 2025 is shown in Figure 4.

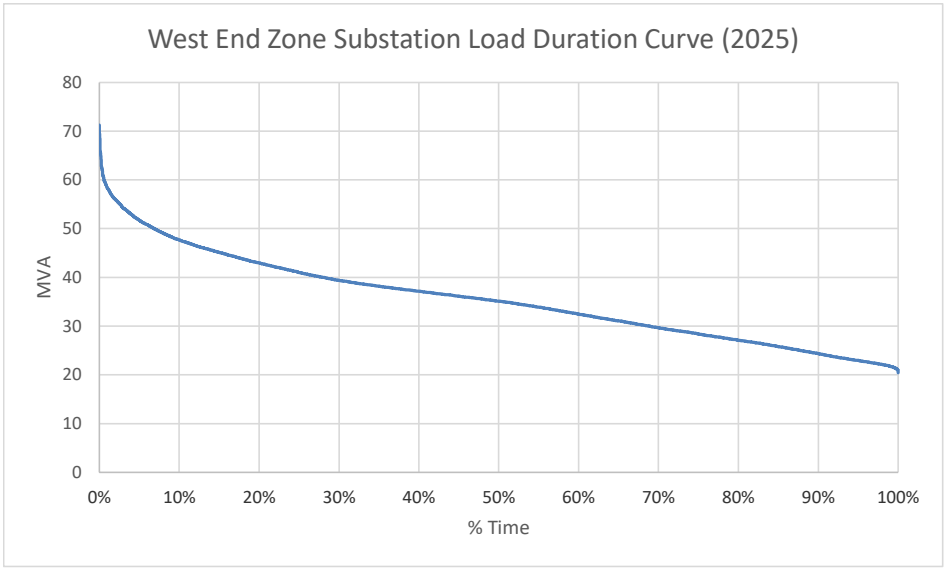

Figure 4: Substation load duration curve

Average Peak Weekday 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 SSWED are historically experienced from late morning to late afternoon.

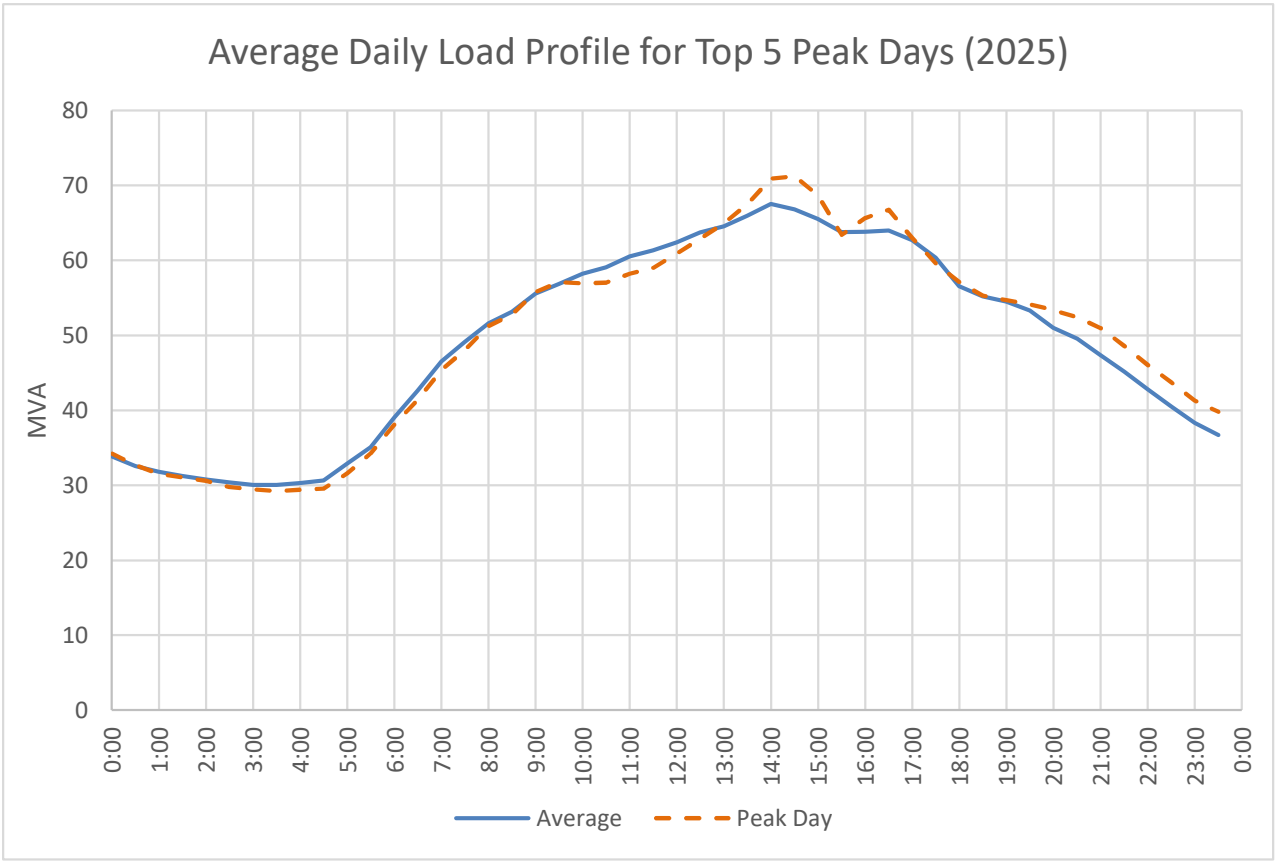

Figure 5: Substation average peak weekday load profile (summer)

1.7 Forecast

Base Case Load Forecast

The 10% PoE and 50% PoE load forecasts for the base case load growth scenario are illustrated in Figure 6. The historical peak load for the past six years has also been included in the graph.

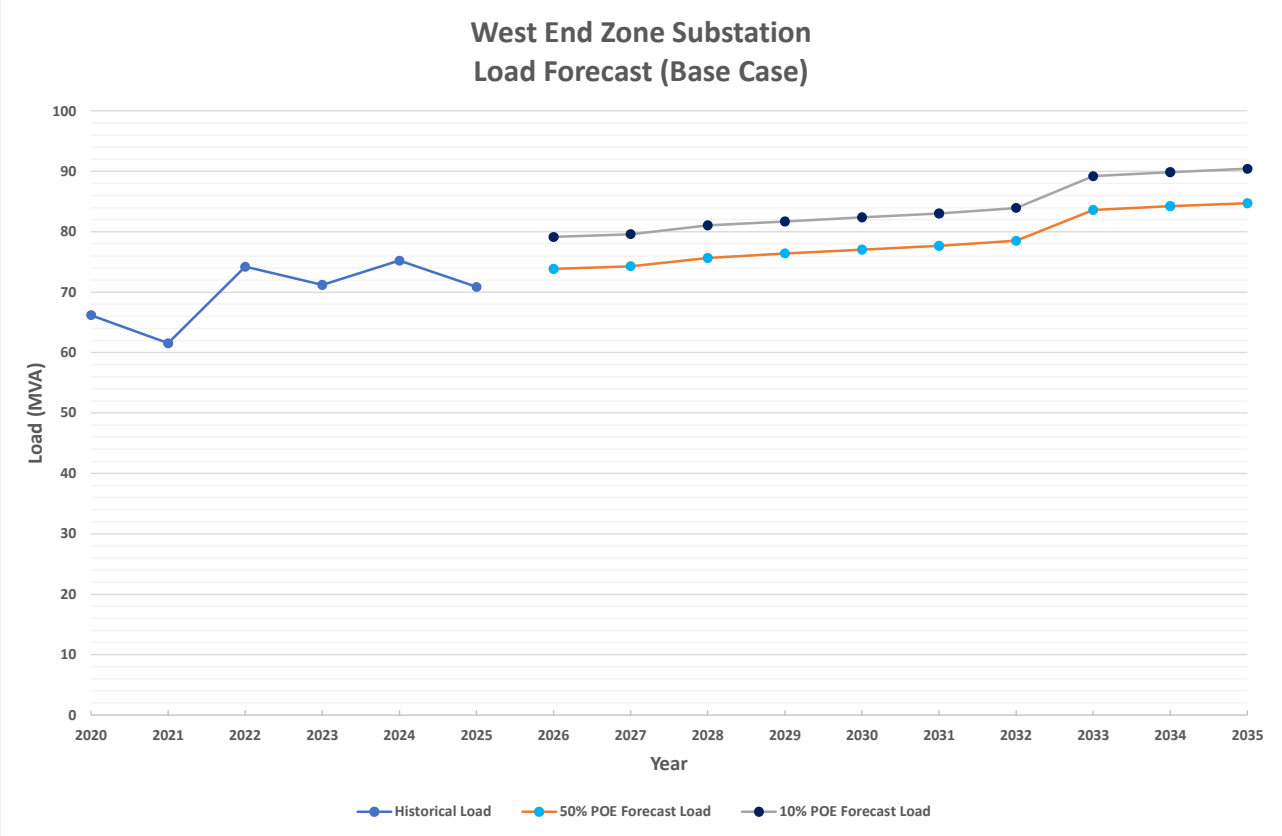

Figure 6: Substation base case load forecast

High Growth Load Forecast

The 10% PoE and 50% PoE load forecasts for the high load growth scenario are illustrated in Figure 7. With the high growth scenario, the peak load is forecast to increase over the next 10 years.

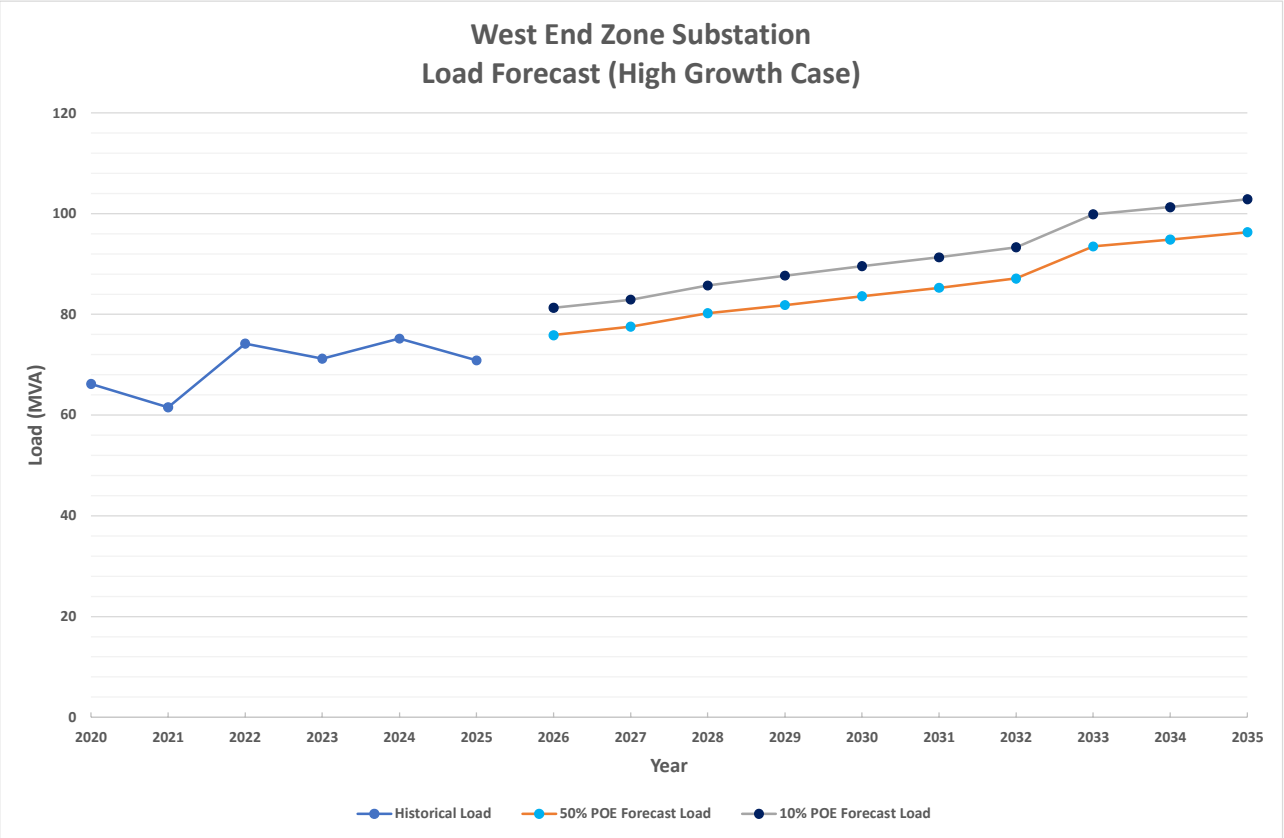

Figure 7: Substation high growth load forecast

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Low Growth Load Forecast

The 10% PoE and 50% PoE load forecasts for the low load growth scenario are illustrated in Figure 8. With the low growth scenario, the peak load is forecast to remain relatively steady over the next 10 years.

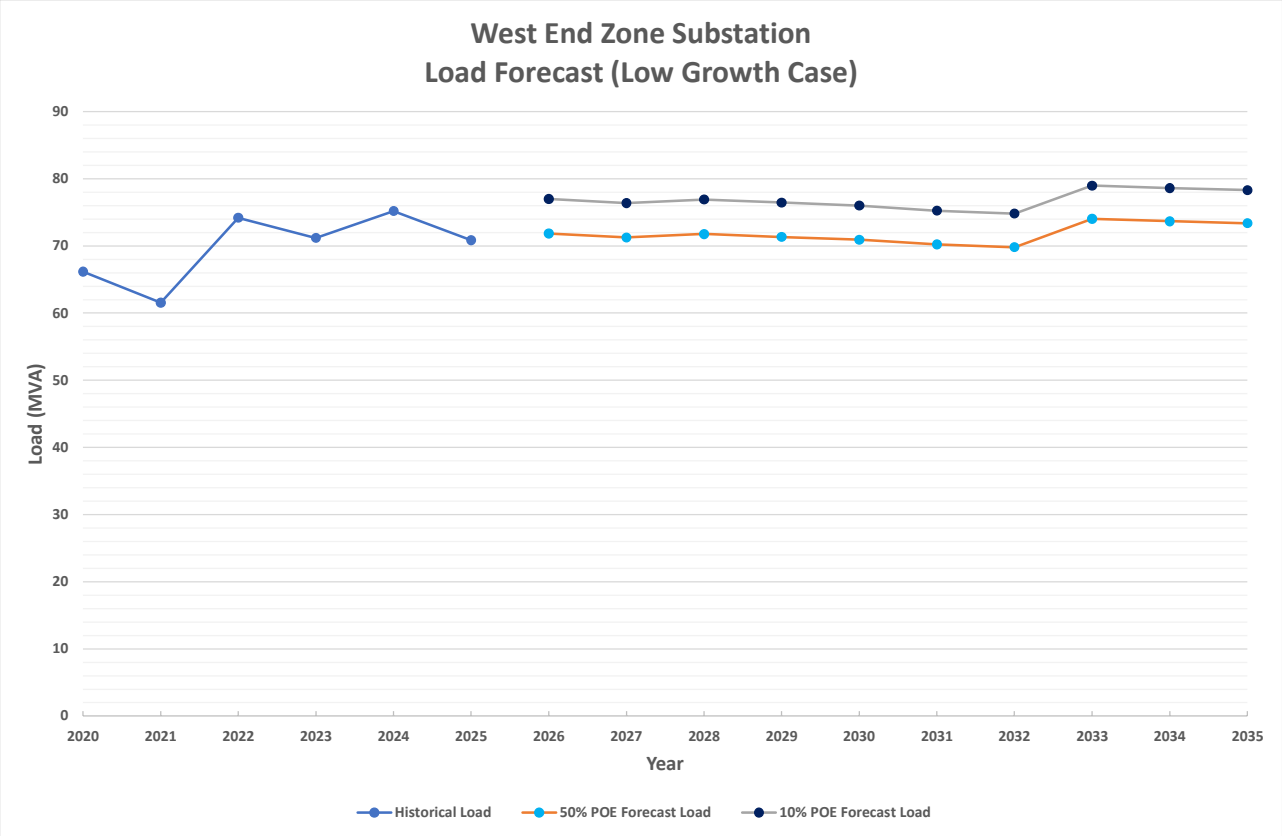

Figure 8: Substation low growth load forecast

2 IDENTIFIED NEED

2.1 Reliability Corrective Action

West End Zone Substation is located on the fringe of the Brisbane CBD, the area is undergoing significant transformation due to urban renewal in recent years, which has resulted in a change in development zoning and relaxation of building heights. The load supplied by SSWED has been increasing as a result and is forecast to continue to increase, led by redevelopment of large industrial sites and activities related to the 2032 Olympics games. Furthermore, SSWED will supply major Olympics venues and infrastructure, in which outages are not acceptable during the games' events.

The above forecasts show that the load will exceed the firm capacity of SSWED, resulting in a reduction in security of supply to customers in the area. It is forecast that, for an outage of a 110/11kV transformer or 110kV feeder at SSWED during peak periods, the remaining transformer will overload and trigger protection operations that will result in total loss of supply to all customer supplied by SSWED.

The identified need is for reliability corrective action to ensure that supply security and reliability of supply are maintained to customers in the West End network area as required under applicable regulatory instruments. To ensure that Energex can continue to meet these requirements, reliability corrective action is required by 2031. If this does not occur, Energex estimates the probability of failure to comply with regulatory requirements is deemed to have reached unacceptably high levels.

Investment in Energex's network is required to continue to meet the service standards and regulatory requirements in its Distribution Authority issued under the *Electricity Act 1994* (Qld). This includes under Clause 10, where Energex is required to design, plan and operate its network to meet the service safety net, which aims to mitigate the risk of low probability-high consequence network outages to avoid unexpected customer hardship and/or significant community or economic disruption. The safety net has specific outage restoration timeframe targets that Energex is required to achieve. Details of the safety net targets are shown in Appendix A.

If Energex did not invest to address this identified need, it may result in a breach of these regulatory obligations, as the failure of a 110kV feeder or a transformer at SSWED can result in approximately 9,400 customers without power, including a major hospital. Supply to these customers cannot be restored within the timeframes stipulated under the safety net targets in the Distribution Authority.

Therefore, Energex considers that reliability corrective actions in the West End area are necessary.

2.2 Associated Relevant Annual Deferred Augmentation Cost

A present value analysis of the costs associated with the lowest cost potential credible option show that there is a saving of approximately $1.2 million for each year the proposed augmentation cost is deferred.

3 POTENTIAL CREDIBLE OPTIONS

Energex has considered all options that could reasonably be classified as a credible option without bias to energy source, technology, ownership and whether it is a network option, a non-network option or a Stand-Alone Power System (SAPS) option.

Energex has not identified any viable non-network solutions that will provide a complete or a hybrid (combined network and non-network) solution to address the identified need. Further reasoning as to how Energex came to this determination is provided below

3.1 Credible Options Identified

Energex has identified one credible network option that will address the identified need that is commercially and technically feasible and can be implemented in sufficient time to meet the identified need.

3.1.1 Option A: Install a new 60MVA 110/11kV Transformer, 110kV and 11kV switchboards

This option will provide an additional 60MVA capacity at SSWED to address the substation limitation to help mitigate Safety Net breaches at SSWED. Furthermore, the installation of a dual secondary winding transformer allows for the future transition to three feeder meshes in the West End 11kV supply network, as per the general arrangement in Brisbane CBD area which provides improved reliability.

This option involves:

- Constructing a building for an additional 60MVA 110/11/11kV transformer and neutral earthing transformer, 110kV GIS, 11kV switchgear, AFLC coupling cells, RMUs and protection panels.
- Installing a 110/11/11kV transformer with associated neutral earthing transformers.
- Installing three buses of additional 110kV switchgear in the new building compromising of six feeder circuit breakers, two bus section circuit breakers and three transformer circuit breakers.
- Installing two buses of additional 11kV switchgear compromising of two transformer circuit breakers, one bus section circuit breaker, nine feeder circuit breakers and two bus-tie circuit breakers.
- Installing three 2.2MVAr capacitor banks and recovery of existing capacitor banks.
- Installing additional AFLC equipment, secondary systems and LV supplies.
- Cutting over 110kV feeder F905 to the new 110kV switchgear.
- Establishing a 110kV bus-tie between the new and existing 110kV bus.
- Cutting over one leg of TR4 to the new 11kV switchboard and connecting one leg of the new transformer to the vacated circuit breaker.
- Connecting the remaining leg of the new transformer to the new 11kV switchboard.
- Cutting over 6x11kV feeders from existing 11kV switchboard to the new 11kV switchboard at SSWED.

Figure 9 provides the proposed network arrangement for Option 1.

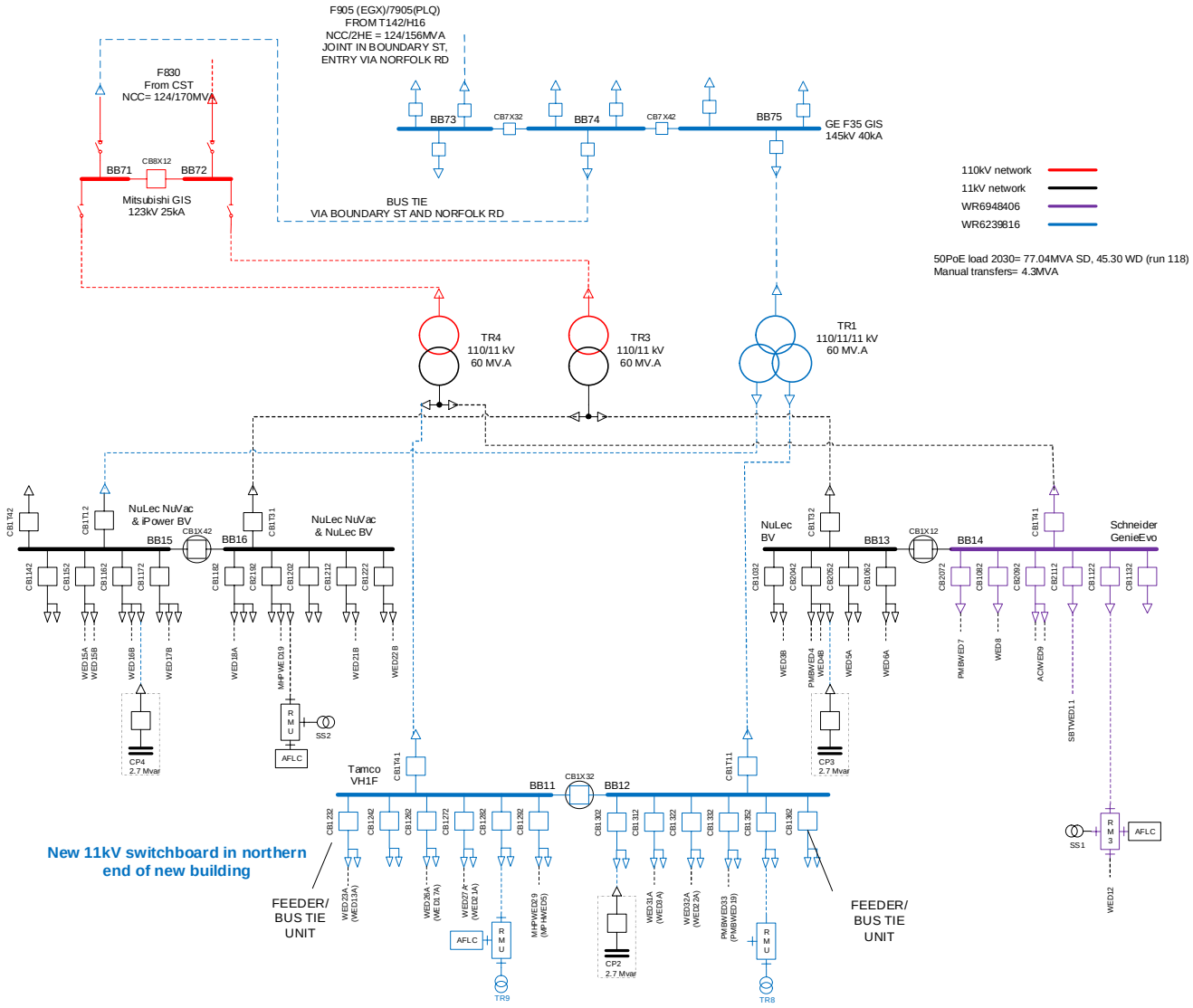

Figure 9: Option A proposed network arrangement (schematic view)

This option is commercially and technically feasible, can be implemented in the timeframe identified and would address the identified need by providing reliable supply and additional capacity to the West End area. The additional capacity will enable Energex to meet the reliability requirements as stipulated in Energex's Distribution Authority.

This option has an estimated capital cost of $43.2 million and operating cost of $9,000 a year. The estimated construction start date would be 2028 and a commissioning date of 2031.

The estimated costs comprise the following components:

- financial costs incurred in constructing and providing the credible option (including land acquisition, early engagement on the potential connection requirements)
- other operating and maintenance costs during the assessment period; and

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- costs of complying with relevant laws, regulations and administrative requirements

The scope of works at SSWED are being contained within the existing and adjacent site that is owned by Energex. Given the reliability and economic benefits of this option to the local community, there are not expected to be social licence issues with this option. No additional costs to manage or increase the delivery timeline have been considered in the evaluation of this option.

3.2 Ranking of Credible Options

Table 2 below summarises the costs of the potential credible options relative to the base case in present value terms to address the identified need. The base case is a 'business as usual' scenario where Energex would not invest in any reliability corrective actions in the network.

Option	Option Name	Rank	Initial Capital Expenditure ($million)	PV of Net Economic Benefit ($million)	PV of Capex ($million)	PV of Opex ($million)	PV of Benefits ($million)
A	Install a new 60MVA 110/11kV Transformer, 110kV and 11kV switchboards	1	-$43.2	-$13.3	-$19.3	-$0.09	$6.03

Table 2: Base case NPV ranking table

3.3 Preferred Option

Energex's preferred option is Option A, to install a new 60MVA 110/11kV Transformer, 110kV and 11kV switchboards at SSWED.

Upon completion of these works, the identified need at SSWED 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. This option will address the identified need, is commercially and technically feasible and can be implemented in sufficient time to meet the identified need.

The estimated direct capital cost of this option is $43.2 million with an annual operating and maintenance cost of $9,000. The estimated project delivery timeframe has design commencing in October 2026 and construction completed by June 2031.

4 SOCIAL LICENCE AND COMMUNITY ENGAGEMENT

4.1 Social Licence

Energex has not identified any social licence considerations that have affected the identification and selection of credible options to address the identified need. The scope of works at SSWED is being contained within the existing and adjacent site that are owned by Energex. Given the reliability and economic benefits to the local community, there are not expected to be social licence issues. Energex will engage with relevant stakeholders as the proposed solution progress.

4.2 Community Engagement

As the scope of works for the preferred option that are largely contained within the existing site and adjacent property owned by Energex, it is not expected to cause any disruption to the community at large. As a result, we have not identified any community stakeholders who might reasonably be expected to be affected by the development of this project. While Energex does not anticipate any community stakeholder concerns, should any be identified, these would be addressed as part of the Energex Community Engagement Framework which is integrated into the project workflow.

5 RATIONALE THAT THERE IS NO VIABLE NON-NETWORK OR SAPS OPTIONS

5.1 Consideration of Non-network and SAPS Options

Energex has assessed potential non-network and SAPS options to address the identified need. Potential credible options must be technically and commercially viable and must be able to be implemented in sufficient time to address the identified need. It has been determined, for the following reasons, that no non-network or SAPS options would be suitable to address the identified need or form part of the solution to address the identified need.

5.1.1 Network Load Control

The commercial/industrial load appears to drive the daily peak demand which generally occurs between 11:00am and 6:00pm.

There are 890 customers on tariff T31 and T33 hot water load control (LC). An estimated demand reduction value of 280kVA is available in Summer.

The demand reduction required at SSWED to address the reliability risk far exceeds the above amount. Therefore, this option has been assessed as technically not viable as it will not address the identified network requirement.

5.1.2 Demand Management Programs

Energex's Demand and Energy Management team completed a review of the SSWED customer base and considered a number of demand management technologies, with reliability corrective action being the key project driver. It has been determined that most demand management options will not be viable options, as discussed in the following sections.

5.1.3 Increased Generation/Supply Options

Generation and storage such as renewable energy generation, solar or wind farms of multiple MW capacity with battery energy storage system (BESS) constitutes an opportunity to support substation investment by reducing demand on, and potentially providing reactive power support for substation assets.

This option could potentially be part of a hybrid network/non-network solution to address the identified need. However, there is no known existing or proposed generation and storage system available in the area. Furthermore, a screening test conducted by Energex shows that the capital and ongoing operating cost of such system is not economical.

5.1.4 Demand Response Arrangements With Customers

Following are four methods utilising demand response technology for deferring network investment:

5.1.4.1 Customer Call Off Load (COL)

COL is an effective technique for deferring network investment where the network support is needed for a short time. There are several large customers in the catchment area, but the required amount

of demand reduction exceeds the amount that is available in the SSWED network. Therefore, COL was assessed as not a viable option.

5.1.4.2 Customer Embedded Generation (CEG)

CEG is an effective technique for deferring network investment where the need is for a short time. However, the required amount of embedded generation exceeds the amount that is available in the SSWED network area. Therefore, CEG was assessed as not a viable option.

5.1.4.3 Large Scale Customer Generation (LSG)

LSG sites such as renewable energy generation, solar or wind farms of multiple MW 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, was assessed as technically not viable as there is no known existing or proposed LSG demand response available.

5.1.4.4 Customer Solar Power Systems

The impact of customers' solar power systems is already included in the load profile and forecast. Hence, solar customers without a BESS will not meet the technical needs of the demand reduction as their solar contribution has already been accounted for.

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

However, only a small percentage of business customers in the SSWED supply area have solar PV and BESS systems. Therefore, this was assessed as not a viable option.

5.1.5 Consideration of SAPS Options

Stand-alone Power Systems are off-grid systems that operate independently from the main network. It typically includes solar panels for electricity generation, a BESS to store excess energy, and a backup generator (often a diesel generator).

Energex considers there are no SAPS options 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 reliability and load requirements, per the forecast of SSWED could not be supported by a network that is not part of the interconnected national electricity system. Furthermore, the capital and ongoing operating cost of such system is uneconomical. Therefore, a SAPS option is not technically and economically viable.

6 CONCLUSION AND NEXT STEPS

Energex has determined that there would not be a non-network or SAPS option that is a potential credible option, or that forms a significant part of a potential credible option, to address the identified need.

Energex publishes this Notice of No Non-network or SAPS as per NER clause 5.17.4 (d).

Energex will be publishing a Draft Project Assessment Report shortly and consultation on that report will be open for a period of at least six weeks.

7 APPENDIX A – SAFETY NET TARGETS

Energex has an obligation to meet the Safety Net Targets under its Distribution Authority. The Safety Net targets are defined by the load impacted and the duration of this impact. The table below shows the specific requirements that Energex needs to achieve.

17
Distribution Authority - No. D07/98
ENERGEX Limited

SCHEDULE 3

Service Safety Net Targets

Feeder Type	Targets
CBD	• Any interruption in customer supply resulting from an N-1 event at the sub-transmission level is restored within 1 minute
Urban	Following an N-1 event, load not supplied must be: • Less than or equal to 40MVA (16,000 customers) for no more than 30 minutes; • Less than or equal to 12MVA (5,000 customers) for no more than 3 hours; • Less than or equal to 4MVA (1,600 customers) for no more than 8 hours; • Fully Restored after 8 hours
Short Rural	Following an N-1 event, load not supplied must be: • Less than or equal to 40MVA (16,000 customers) for no more than 30 minutes; • Less than or equal to15MVA (6,000 customers) for no more than 4 hours; • Less than or equal to 10MVA (4,000 customers) for no more than 12 hours; • Fully Restored after 12 hours

Notes:
- All modelling and analysis will be benchmarked against 50 POE Loads and based on credible contingencies.
- Outages ≤ 3 minutes in duration excluded from Safety Net Targets.

[as inserted on 05 December 2025]