1. AusNet Services' Asset Renewal Plan

This section outlines AusNet Services' asset management strategy and approach, and lists the planned asset retirements and asset renewal projects planned for the next 10-year period. The asset renewal plan addresses asset failure risk based on asset condition and network performance. It also considers other operational factors that affect the economic service life of the electricity transmission assets.

AusNet Services' asset renewal plan does not propose any network changes that will have a material inter-network impact and AusNet Services has liaised with AEMO to integrate the asset renewal plan with AEMO's transmission augmentation plan for Victoria as well as AEMO's National Transmission Network Development Plan (NTNDP) and Integrated System Plan (ISP).

AEMO and AusNet Services confirm that the 2018 Asset renewal plan is aligned with the most recent NTNDP and the development strategies for current or potential national transmission flow paths that are specified in the NTNDP. No issues have been identified in the 2018 Asset renewal plan that may impact on any of the system constraints identified in the Transmission Annual Planning Report.

AEMO has also been consulted to review and assess the asset renewal plan in relation to the most recent power system frequency risk review.

Non-network options are considered in AusNet Services' asset renewal approach once an identified need has been determined and include options such as demand side response and embedded generation.

Asset management strategy, asset renewal approach and asset renewal objectives

AusNet Services' electricity transmission Asset Management Strategy (AMS) provides robust technical direction for the responsible stewardship of electricity transmission assets that AusNet Services manages as a service to Victoria's energy users and the National Electricity Market (NEM).

The AMS is central to AusNet Services' Electricity Safety Management Scheme (ESMS) for managing Victoria's electricity transmission assets and the delivery of quality services to customers and value to shareholders. It summarises the medium term strategic actions for achieving regulatory and business performance targets, which are implemented via the programs of work.

The AMS is underpinned by the regulatory and commercial imperatives of delivering efficient cost and service performance. It recognises that cost and service efficiency does not mean lowest possible cost, nor does it mean guaranteed reliability. Instead, efficiency requires the costs and benefits of all expenditure decisions to be weighed against one another. A key element in this cost benefit analysis is the consideration of risk in relation to asset performance and network reliability.

AusNet Services' ongoing commitment to maintain compliance with the ISO 55001 standard ensures an auditable asset management system facilitating customer's expectations to safely maintain the quality, reliability and security of supply in an economic manner.

The objective of asset renewal is to achieve sustainable outcomes in the following areas:

- Safety of customers, the community and workers
- · Quality, reliability and security of electricity transmission services
- Compliance with regulation, codes, licences, contracts and industry standards
- Minimising total life cycle costs through the consideration of capital costs, operation and maintenance costs and
 operational risk costs
- Minimising the volatility of renewal works and associated material, skill and revenue requirements
- Minimising project delivery risks and the potential impact of renewal works on network availability, market
 participants and connected parties
- Minimising immediate and future environmental impacts
- Minimising network security risks by replacing obsolete protection and control equipment that is no longer supported by manufacturers
- Modernisation of protection and control systems to provide remote interrogation and diagnostics

Asset renewal options

Renewal on Performance Risk is employed to optimise the lifecycle cost of assets through consideration of health, safety and environmental factors as well as the community cost based on the performance of the assets. This strategy requires sufficient asset condition and performance monitoring to predict deterioration of the respective plant with sufficient lead-time to enable renewal prior to failure.

The following asset renewal options are considered in the asset renewal evaluation and project specification:

- Renewal by Asset Class is employed when a class of assets has either a higher than acceptable failure rate or exhibits a higher deterioration rate than its peers. This approach avoids wide spread deterioration in network performance due to multiple, asset class-related failures.
- Selective or Staged Replacement
- Renewal on a Bay-by-Bay (or Scheme/Network) basis is employed when it is economic to replace all primary plant and equipment within a specific bay or scheme. This strategy is often adopted for terminal station renewals.
- Replacement of Whole Station in Existing Location (Brownfield) is employed when it is economic to replace most assets as part of a single, coordinated project within the existing station (normally when station assets are approaching the end of their life and there are advantages in reconfiguring primary electrical circuits).
- Replacement of Whole Station in New Location (Greenfield) is employed for the construction of a replacement station on a new site. It is a more expensive strategy than works within an existing station due to the need to procure new land, establish key infrastructure, and to relocate lines. It is usually only economic when the existing infrastructure is inadequate and replacement works cannot occur without a sustained supply disruption due to limitations at the existing site.

10-year asset renewal plan

The 10-year plan (in calendar years) focuses on major asset renewal projects and has been finalised with input from AEMO in accordance with the integrated planning approach agreed with AEMO.

The description of the proposed replacement in Table 1 includes the main plant items. AusNet Services is undertaking asset condition surveys to quantify specific line works and the asset renewal plan allows for expected needs, such as the replacement of insulators and corroded conductors.

The project completion dates provide an indication of the likely timing of these projects and are subject to further analysis prior to committing to deliver these projects. A higher degree of uncertainty is placed on projects scheduled for the later part of the ten-year planning period. The cost estimates provided are indicative and could vary significantly due to factors such as the circuit outages required to safely implement the asset renewal. The cost estimates allow for the entire project cost including project management cost, overheads and finance cost.

Wherever possible, asset renewal works are planned at times that minimise the impact of circuit outages. The plan is subject to change based on the results of further asset condition analysis, asset failures necessitating a reprioritisation of projects and regulatory revenue decisions.

Five major redevelopment projects are planned to be completed during the ten year planning period namely Richmond, West Melbourne, East Rowville, Springvale and Red Cliffs terminal stations. The Richmond, West Melbourne, East Rowville and Springvale redevelopment projects are currently in their build phases.

Different replacement options for the Keilor 500/220 kV transformers are being considered in a joint study with AEMO to identify the most economic replacement option.

No urgent or unforseen network issues have been identified to date.

Other than for minor scope, project completion date and estimated cost changes, no significant changes are reported in the current plan compared with last years' plan.

Table 1 provide the ten year asset retirement and renewal plan and Table 2 provides more details regarding the network constraints.

Further information on the asset management strategy and methodology

Further information on the asset management strategy and methodology can be obtained by contacting the following person at AusNet Services:

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Table 1: Ten-year asset renewal plan (cost estimates are in 2018 dollars)

Project Name	Location	Total Cost (Real \$M)	Target Completion (December)	Network Assets to be Retired	Reasons for Retirement	Date of Retirement	Constraints	Proposed Replacement	Options Considered	Request for Proposal Date	Changes Compared with Last Plan
YPS 220kV Circuit Breaker Replacement Stage 1	Yallourn Power Station Switchyard	21	2018	Seven 220kV Circuit Breakers and the associated Current Transformers	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	Asset retirements are in progress and will continue in 2018	Switching/ generation constraints	Seven 220kV Circuit Breakers	Refurbishment, integrated replacement and staged replacement.	A request for proposal will not be issued for this project as it is a committed project and is already in its build phase	Change to in service date
FBTS 220kV and 66kV Circuit Breaker Replacement Stage 1	Fishermens Bend Terminal Station	17	2018	One 220kV Circuit Breaker and nine 66kV Circuit Breakers	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	2018 to 2020	Load at risk	One 220kV Circuit Breaker and nine 66kV Circuit Breakers	Integrated replacement and staged replacement	A request for proposal will not be issued for this project as it is a committed project and is already in its build phase	No change
SMTS 330/220kV Transformer Replacement - Stage 1	South Morang Terminal Station	34	2018	One 700 MVA 330/220 kV transformer	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	Asset retirements are in progress and will continue in 2018	Load at risk	One 700 MVA 330/220 kV transformer and 330kV switched bay	Integrated replacement, staged replacement, replacement with single phase or three phase transformers and replacement with larger transformers in consultation with AEMO	A request for proposal will not be issued for this project as it is a committed project and is already in its build phase	No change
RTS Redevelopment	Richmond Terminal Station	188	2018	Five 150MVA 220/66kV transformers, two 165MVA 220/22kV transformers, 220kV switchyard, 66kV switchyard and 22kV switchyard	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	Asset retirements are in progress and will continue in 2018	Load at risk	Three 225MVA 220/66kV transformers, two 75 MVA 220/22 kV transformers, three breaker-and-half 220kV GIS switch bays, four 66kV GIS busses, 22kV GIS switchboard and associated protection and control systems	Integrated replacement, staged replacement, replacement on a new site and replacement with larger transformers in consultation with Distribution Businesses	A request for proposal will not be issued for this project as it is a committed project and is already in its build phase	No change
RWTS B4 Transformer and 66kV Circuit Breaker Replacement	Ringwood Terminal Station	16	2018	One 150 MVA 220/66kV transformer and six 66kV Circuit Breakers	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	Asset retirements are in progress and will continue in 2018	Load at risk	One 150 MVA 220/66kV transformer and six 66kV Circuit Breakers	Integrated replacement and staged replacement	A request for proposal will not be issued for this project as it is a committed project and is already in its build phase	No change
HWPS 220kV Circuit Breaker Replacement - Stage 4	Hazelwood Power Station Switchyard	24	2019	Seven 220kV circuit breakers, nine current transformers, nine voltage transformers and thirty- nine disconnectors	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	2018 to 2019	Load at risk	Seven 220kV circuit breakers, nine current transformers, nine voltage transformers and thirty-nine disconnectors	Integrated replacement and staged replacement	A request for proposal will not be issued for this project as it is a committed project and is already in its build phase	Change to Scope, cost & completion date
LYPS and HWTS 500kV Circuit Breaker Replacement Stage 1	Loy Yang Power Station Switchyard and Hazelwood Terminal Station	29	2019	Four 500kV circuit breakers, six 500kV current transformers and two 500kV voltage transformers	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	2018 to 2019	Switching/ generation constraints	Eight 500kV circuit breakers, six 500kV current transformers and two 500kV voltage transformers	Integrated replacement and staged replacement	A request for proposal will not be issued for this project as it is a committed project and is already in its build phase	Change to Scope, cost & completion date
HYTS 500kV switchgear replacement	Heywood Terminal Station	10	2019	500 kV instrument transformers	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	2018 to 2019	Switching constraints	Two 500kV circuit breakers and associated equipment	Integrated replacement and staged replacement	A request for proposal will not be issued for this project as it is a committed project and is already in its build phase	Change to in service date and cost estimate

Project Name	Location	Total Cost (Real \$M)	Target Completion (December)	Network Assets to be Retired	Reasons for Retirement	Date of Retirement	Constraints	Proposed Replacement	Options Considered	Request for Proposal Date	Changes Compared with Last Plan
Transmission fall arrest installation program	Different locations of the transmission network	20	2019	None	Safety risk mitigation	N/A	Safety risk	Install fall arrests	Do Nothing (i.e. continue with the use of dual lanyard); Defer project to next Reset and Do installation work	A request for proposal will not be issued for this project as it is a committed project and is already in its build phase	No change
Upgrade SCADA at Non- SCIMS and Old SCIMS Sites	Newport, Sydenham, Moorabool, Jeeralang, Rowville, Loy Yang, East Rowville, Springvale, Tyabb and Templestowe Terminal Stations	7	2019	Selected obsolete SCADA systems at Non-SCIMS and old SCIMS sites at 10 Stations	Obsolete technology. Compliance obligation.	2018 - 2019	Load at risk	Replace obsolete secondary assets with current standard equipment	Integrated replacement and staged replacement	A request for proposal will not be issued for this project as it is a committed project	No change
ROTS No.2 SVC Controls and Protection Replacement.	Rowville Terminal Station	10	2020	ROTS No.2 SVC Controls and Protection Replacement.	Obsolete technology. Compliance obligation.	2019 - 2020	Load at risk	Replace with current standard assets	Integrated replacement and staged replacement	A request for proposal will not be issued for this project as it is a committed project and is already in its build phase	No change
North West Communication Network Replacement	Between Bendigo and north of Horsham	40	2020	Power Line Carrier (PLC) assets	Obsolete technology	2018 to 2020	Switching/ generation constraints	Combination of fibre optic and microwave technology	Business as usual, replace with fibre optic & microwave and replace with fibre optic	A request for proposal will not be issued for this project as it is a committed project	change to scope, cost & completion date (Four projects in the previous plan combined achieving delivery efficiency)
OTN Replacement program	Several terminal stations	7	2020	Telephony Network at 48 terminal stations	Obsolete technology. Compliance obligation.	2019 - 2020	Load at risk	Telephony Network at 48 terminal stations	Do nothing or End of Life replacement	A request for proposal will not be issued for this project as no alternative non-network solution is envisaged.	No change
RS Battery & Charger Replacements 1	Several locations	10	2020	Selected obsolete communication and control batteries	End of Life replacement	2017-2020	Load at risk	Replace with current standard assets	Business as usual or asset replacement	A request for proposal will not be issued for this project as it is a committed project	No change
FBTS Transformer and circuit breaker replacement	Fishermens Bend Terminal Station	18	2020	One 150 MVA 220/66kV transformer, one 220kV circuit breakers and four 66kV Circuit Breakers	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	2019 to 2020	load at risk (Refer Table 2 for details)	One 150 MVA 220/66kV transformer, one 220kV circuit breakers and four 66kV Circuit Breakers	Integrated replacement, staged replacement and replacement with larger transformers	A request for proposal will not be issued for this project as it is a committed project and is already in its build phase	Change in scope and cost
ERTS Redevelopment - Stage 1	East Rowville Terminal Station	14	2020	One 150 MVA 220/66kV transformer, two 220kV circuit breakers and three 66kV Circuit Breakers	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	2019 to 2020	load at risk (Refer Table 2 for details)	One 150 MVA 220/66kV transformer, two 220kV circuit breakers and three 66kV Circuit Breakers	Integrated replacement and staged replacement	A request for proposal will not be issued for this project as it is a committed project and is already in its build phase	Change in scope and cost
WMTS Redevelopment	West Melbourne Terminal Station	128	2021	Four 150MVA 220/66kV transformers, 220kV switchyard, 66kV switchyard and 22kV switchyard	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	2018 - 2021	Load at risk	Three 225MVA 220/66kV transformers, four breaker-and-half 220kV GIS switch bays, two 66kV GIS busses, 22kV GIS switchboard and associated protection and control systems	Integrated replacement, staged replacement, replacement on a new site and replacement with larger transformers in consultation with Distribution Businesses	A request for proposal will not be issued for this project as it is a committed project and is already in its build phase	No change

Project Name	Location	Total Cost (Real \$M)	Target Completion (December)	Network Assets to be Retired	Reasons for Retirement	Date of Retirement	Constraints	Proposed Replacement	Options Considered	Request for Proposal Date	Changes Compared with Last Plan
SVTS Redevelopment	Springvale Terminal Station	53	2021	Three 150 MVA 220/66kV transformers, four 220kV circuit breakers and nineteen 66kV Circuit Breakers	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	2019 - 2021	Load at risk	Three 150 MVA 220/66kV transformers, twelve 220kV circuit breakers and nineteen 66kV Circuit Breakers	Integrated replacement, staged replacement, replacement on a new site and replacement with larger transformers in consultation with Distribution Businesses	A request for proposal will not be issued for this project as it is a committed project and is already in its build phase	Change in cost estimate
Critical relay replacement at various terminal stations Stage 1 & 2	Several terminal stations	8	2021	Obsolete protection relays	Obsolete technology. Compliance obligation.	2020 to 2021	Load at risk	Replace with current standard assets	Integrated replacement and staged replacement	A request for proposal will not be issued for this project as no alternative non-network solution is envisaged.	No change
TSTS B2 Transformer and 66kV Circuit Breaker Replacement	Templestowe Terminal Station	34	2022	One 150 MVA 220/66kV transformer and thirteen 66kV Circuit Breakers	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	2021 to 2022	load at risk (Refer Table 2 for details)	One 150 MVA 220/66kV transformer and thirteen 66kV Circuit Breakers	Integrated replacement, staged replacement, demand side management, embedded generation and retirement	2019	Change to completion date
HOTS SVC Controls and Protection Replacement	Horsham Terminal Station	9	2022	Selected SVC Controls and Protection assets	Obsolete technology. Compliance obligation.	2021 to 2022	Load at risk	Replace with current standard assets	Integrated replacement, staged replacement and retirement	A request for proposal will not be issued for this project as no alternative non-network solution is envisaged.	No change
Transmission ground wire & conductor replacement	KTS-BLTS, TTS-KTS, ROTS-RTS, DDTS-SMTS, HWPS-ROTS and YPS- ROTS transmission lines	18	2022	Selected groundwire & conductor sections	Condition and risk based replacement	2021 to 2022	Load at risk	Replace with new groundwire & conductor	Defer the work, selected asset replacement	A request for proposal will not be issued for this project as no alternative non-network solution is envisaged.	No change
Transmission fall arrest installation program	SYTS-MLTS, MLTS-TRTS, MLTS-MOPS, MLTS-HYTS and HYTS- APD 500kV lines	16	2022	None	Safety risk mitigation	2021 to 2022	Safety risk	Install fall arrests	Do Nothing (i.e. continue with the use of dual lanyard); Defer project to next Reset and Do installation work	A request for proposal will not be issued for this project as no alternative non-network solution is envisaged.	No change
DC Supply Upgrade Stage 3	Ballarat, East Rowville, Frankston, Kerang, Shepparton, South Morang and Sydenham terminal stations	14	2023	Selected DC supply assets	Replacement of obsolete systems. Compliance	2022 to 2023	Load at risk	Replace obsolete secondary assets with current standard equipment	Integrated replacement and staged replacement	A request for proposal will not be issued for this project as no alternative non-network solution is envisaged.	No change
Moorabool Terminal Station Circuit Breaker Replacement	Moorabool Terminal Station	25	2023	Eight 500kV circuit breakers and ten 500kV voltage transformers	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	2022 to 2023	Switching constraints	Eight 500kV circuit breakers and ten 500kV voltage transformers	Integrated replacement, staged replacement and retirement	A request for proposal will not be issued for this project as no alternative non-network solution is envisaged.	Change in cost estimate

Project Name	Location	Total Cost (Real \$M)	Target Completion (December)	Network Assets to be Retired	Reasons for Retirement	Date of Retirement	Constraints	Proposed Replacement	Options Considered	Request for Proposal Date	Changes Compared with Last Plan
SMTS 330/220kV Transformer Replacement - Stage 2	South Morang Terminal Station	35	2023	One 700 MVA 330/220 kV transformer	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	2022 to 2023	load at risk (Refer Table 2 for details)	One 700 MVA 330/220 kV transformer and a spare phase	Integrated replacement, staged replacement, asset retirement, demand side management, embedded generation and retirement	2020	Change to completion date
MWTS 66kV Circuit Breaker Replacement	Morwell Terminal Station	10	2024	Thirteen 66kV circuit breakers	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	2023 to 2024	load at risk (Refer Table 2 for details)	Thirteen 66kV circuit breakers	Integrated replacement, staged replacement, demand side management, embedded generation and retirement	2021	Change to in service date and cost estimate
RCTS Transformer and Circuit Breaker Replacement	Red Cliffs Terminal Station	18	2024	Two 70MVA 220/66kV transformers, two 21.5MVA 220/22kV transformers and two 66kV circuit breakers	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	2023 to 2024	load at risk (Refer Table 2 for details)	One 150MVA 220/66kV transformer, two 20/33 MVA 66/22kV transformers and two 66kV circuit breakers	Integrated replacement, staged replacement, demand side management, embedded generation and retirement	2021	Change in cost estimate
KGTS B2 and B3 Transformer and Circuit Breaker Replacement	Kerang Terminal Station	18	2024	Two 37MVA 220/66kV transformers and two 22kV circuit breakers	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	2023 to 2024	load at risk (Refer Table 2 for details)	Two 37MVA 220/66kV transformers and two 22kV circuit breakers	Integrated replacement, staged replacement, replacement with larger transformers, demand side management, embedded generation and retirement	2021	Change in cost estimate
FBTS B3 Transformer and Circuit Breaker Replacement	Fishermens Bend Terminal Station	10	2024	One 150MVA 220/66kV transformer and four 66kV circuit breakers	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	2023 to 2024	load at risk (Refer Table 2 for details)	One 150MVA 220/66kV transformer and four 66kV circuit breakers	Integrated replacement, staged replacement, asset retirement, demand side management, embedded generation and retirement	2021	Change in scope and cost
RWTS B3 Transformer Replacement	Ringwood Terminal Station	10	2024	One 150MVA 220/66kV transformer	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	2023 to 2024	load at risk (Refer Table 2 for details)	One 150MVA 220/66kV transformer	Integrated replacement, staged replacement, asset retirement, demand side management, embedded generation and retirement	2021	No change
LYPS and HWTS 500kV Circuit Breaker Replacement Stage 2	Loy Yang Power Station Switchyard and Hazelwood Terminal Station	40	2024	Fourteen 500kV circuit breakers	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	2023 to 2024	Switching/ generation constraints	Fourteen 500kV circuit breakers	Integrated replacement, staged replacement and retirement	A request for proposal will not be issued for this project as no alternative non-network solution is envisaged.	New project
GTS B4 Transformer and 66kV Circuit Breaker Replacement	Geelong Terminal Station	16	2024	One 150MVA 220/66kV transformer and six 66kV circuit breakers	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	2023 to 2024	load at risk (Refer Table 2 for details)	One 150MVA 220/66kV transformer and six 66kV circuit breakers	Integrated replacement, staged replacement, replacement with larger transformers, demand side management, embedded generation and retirement	2021	New project
TTS B4 Transformer and 66kV Circuit Breaker Replacement	Thomastown Terminal Station	25	2025	One 150MVA 220/66kV transformer and eleven 66kV circuit breakers	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	2024 to 2025	load at risk (Refer Table 2 for details)	One 150MVA 220/66kV transformer and eleven 66kV circuit breakers	Integrated replacement, staged replacement, asset retirement, demand side management, embedded generation and retirement	2022	Change to completion date

Project Name	Location	Total Cost (Real \$M)	Target Completion (December)	Network Assets to be Retired	Reasons for Retirement	Date of Retirement	Constraints	Proposed Replacement	Options Considered	Request for Proposal Date	Changes Compared with Last Plan
BLTS 220kV, 66kV and 22kV Circuit Breaker Replacement	Brooklyn Terminal Station	19	2025	Four 220kV circuit breakers, thirteen 66kV circuit breakers and three 22kV circuit breakers	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	2024 to 2025	load at risk (Refer Table 2 for details)	Four 220kV circuit breakers, thirteen 66kV circuit breakers and three 22kV circuit breakers	Integrated replacement, staged replacement, asset retirement, demand side management, embedded generation and retirement	2022	No change
Transmission line insulator replacement project	MLTS-TRTS, MLTS-MOPS, KTS-GTS, KTS-WMTS and TTS-KTS lines	35	2025	Selected insulators	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	2024 to 2025	Load at risk	New insulators	Business as usual, Defer the work and asset replacement	A request for proposal will not be issued for this project as no alternative non-network solution is envisaged.	No Change
WOTS 330kV and 66kV Circuit Breaker Replacement	Wodonga Terminal Station	18	2025	Four 330kV circuit breakers and six 66kV circuit breakers	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	2024 to 2025	load at risk (Refer Table 2 for details)	Four 330kV circuit breakers, six 66kV circuit breakers and one spare 75MVA 330/66kV transformer	Integrated replacement, staged replacement, asset retirement, demand side management, embedded generation and retirement	2022	No change
LY 66kV Circuit Breaker Replacement	Loy Yang 66kV Switch Yard	14	2025	Sixteen 66kV circuit breakers	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	2024 to 2025	load at risk (Refer Table 2 for details)	Sixteen 66kV circuit breakers	Integrated replacement, staged replacement, asset retirement, demand side management, embedded generation and retirement	2022	No change
TSTS B3 Transformer Replacement	Templestowe Terminal Station	9	2025	One 150MVA 220/66kV transformer and one 66kV circuit breaker	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	2024 to 2025	load at risk (Refer Table 2 for details)	One 150MVA 220/66kV transformer and one 66kV circuit breaker	Integrated replacement and staged replacement, replace with larger or smaller transformers, asset retirement, demand side management and embedded generation.	2022	No change
ROTS 220kV Circuit Breaker Replacement	Rowville Terminal Station	6	2025	Five 220kV circuit breakers	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	2024 to 2025	load at risk (Refer Table 2 for details)	Five 220kV circuit breakers	Integrated replacement, staged replacement and retirement	A request for proposal will not be issued for this project as no alternative non-network solution is envisaged.	No change
KTS A2, A3 and A4 500/220kV and B4 220/66kV Transformer Replacement	Keilor Terminal Station	55	2026	Three 750MVA 500/220kV transformers and one spare phase. One 150MVA 220/66kV transformer	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	2024 to 2026	load at risk (Refer Table 2 for details)	Two 1000MVA 500/220kV transformers and a spare phase, one 150MVA 220/66kV transformer	Integrated replacement and staged replacement, replace with larger or smaller transformers, asset retirement, demand side management and embedded generation.	2022	Change to completion date
ERTS Redevelopment - Stage 2	East Rowville Terminal Station	24	2026	Two 150MVA 220/66kV transformers and fifteen 66kV circuit breakers	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	2025 to 2026	load at risk (Refer Table 2 for details)	Two 150MVA 220/66kV transformers and fifteen 66kV circuit breakers	Integrated replacement, staged replacement, asset retirement, demand side management, embedded generation and retirement	2023	Change in scope and cost
TBTS B1 and B2 Transformer Replacement	Tyabb Terminal Station	17	2026	Two 150MVA 220/66kV transformers, one 220kV circuit breakers and four 66kV circuit breakers	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	2025 to 2026	load at risk (Refer Table 2 for details)	Two 150MVA 220/66kV transformers, one 220kV circuit breakers and four 66kV circuit breakers	Integrated replacement, staged replacement, asset retirement, demand side management, embedded generation and retirement	2023	No change

Project Name	Location	Total Cost (Real \$M)	Target Completion (December)	Network Assets to be Retired	Reasons for Retirement	Date of Retirement	Constraints	Proposed Replacement	Options Considered	Request for Proposal Date	Changes Compared with Last Plan
Transmission line conductor and ground-wire replacement project at 500kv lines along South-West area	SYTS-MLTS, MLTS-HYTS and HYTS- APD 500kV lines	48	2026	Selected groundwire & conductor sections	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	2025 to 2026	Load at risk	Replace with new groundwire & conductor sections	Business as usual, Defer the work and asset replacement	A request for proposal will not be issued for this project as no alternative non-network solution is envisaged.	No change
OPGW on ROTS-YPS No.5 & 6 Lines	ROTS-YPS No.5 & 6 Lines	7	2026	Selected groundwire sections	Obsolete technology. Compliance obligation.	2025 to 2026	Switching/ generation constraints	Optical Ground Wire (OPGW)	Business as usual, Defer the work and asset replacement	A request for proposal will not be issued for this project as no alternative non-network solution is envisaged.	No change
YPS 220kV Circuit Breaker Replacement Stage 2	Yallourn Power Station Switchyard	27	2026	Eleven 220kV circuit breakers	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	2025 to 2026	load at risk (Refer Table 2 for details)	Eleven 220kV circuit breakers	Integrated replacement, staged replacement and retirement	A request for proposal will not be issued for this project as no alternative non-network solution is envisaged.	No change
SMTS 500kV GIS Replacement	South Morang Terminal Station	70	2026	Fifteen 500kV GIS circuit breakers and associated equipment	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	2025 to 2026	load at risk (Refer Table 2 for details)	Fifteen 500kV GIS circuit breakers and associated equipment	Integrated replacement, staged replacement and retirement	A request for proposal will not be issued for this project as no alternative non-network solution is envisaged.	New Project
Transmission line conductor and ground-wire replacement project at 500kv lines along Latrobe valley	LYPS-HWTS, HWTS-CBTS, SMTS-SYTS and HWTS- ROTS 500kV lines	65	2027	Selected groundwire & conductor sections	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	2026 to 2027	Load at risk	Replace with new groundwire & conductor sections	Business as usual, Defer the work and asset replacement	A request for proposal will not be issued for this project as no alternative non-network solution is envisaged.	New Project
SHTS B2 and B3 Transformer Replacement	Shepparton Terminal Station	17	2027	Two 150MVA 220/66kV transformers and five 66kV circuit breakers	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	2027 - 2028	load at risk (Refer Table 2 for details)	Two 150MVA 220/66kV transformers and five 66kV circuit breakers	Business as usual, asset replacement, demand side management, embedded generation and retirement	2024	New Project
DDTS H3 330/220kV Transformer and 330kV Circuit Breaker Replacement	Dederang Terminal Station	20	2028	One 340MVA 330/220kV transformer and two 330kV Circuit Breakers	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	2027 - 2028	load at risk (Refer Table 2 for details)	One 340MVA 330/220kV transformer and two 330kV Circuit Breakers	Integrated replacement and staged replacement, replace with larger or smaller transformers, asset retirement, demand side management and embedded generation.	2025	New Project
GTS 220 kV Circuit Breaker Replacement	Geelong Terminal Station	9	2028	Five 220kV circuit breakers	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	2027 - 2028	load at risk (Refer Table 2 for details)	Five 220kV circuit breakers	Business as usual, asset replacement and retirement	A request for proposal will not be issued for this project as it is a committed project	New Project
SMTS F2 Transformer and associated switchgear Replacement	South Morang Terminal Station	30	2028	1000MVA 500/330kV transformer with associated switchgear	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	2026 - 2028	load at risk (Refer Table 2 for details)	1000MVA 500/330kV transformer with associated switchgear	Business as usual, asset replacement, demand side management, embedded generation and retirement	2024	New Project
Transmission line insulator replacement	ROTS-MTS, ROTS-RTS, NPSD-FBTS, FBTS-BLTS, CBTS-TBTS and CBTS- FTS lines	41	2028	Selected insulators	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	2027 - 2028	Load at risk	New insulators	Business as usual, Defer the work and asset replacement	A request for proposal will not be issued for this project as no alternative non-network solution is envisaged.	New Project

Project Name	Location	Total Cost (Real \$M)	Target Completion (December)	Network Assets to be Retired	Reasons for Retirement	Date of Retirement	Constraints	Proposed Replacement	Options Considered	Request for Proposal Date	Changes Compared with Last Plan
SYTS 500kV GIS Replacement	Sydenham Terminal Station	50	2028	Five 500kV GIS CBs and	Condition and age of assets presenting a safety, supply, environmental and collateral damage risk in the event of an asset failure.	2027 - 2028	Switching constraints	Five 500kV GIS CBs and associated equipment	Business as usual, asset replacement and retirement	A request for proposal will not be issued for this project as no alternative non-network solution is envisaged.	New Project

Table 2: Detailed information of projects

Project Name	TSTS B2 Transformer and 66kV Circuit Breaker Replacement											
Location of	630 - 658, Blackburn Road, Templestowe											
Constraint												
Element	Connection station											
Constraint type	Load at risk											
Existing element	450MVA											
rating												
Load forecast	TSTS (MVA) 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027											
	Summer10 377.3 377.6 377.0 374.5 371.3 369.9 374.1 379.7 380.5 380.9											
	Summer10 377.5											
	Winter10 241.5 240.2 239.5 238.1 236.7 236.2 234.6 233.5 233.5 232.7											
NA	Winter50 233.9 232.3 231.8 230.5 228.6 227.9 226.4 225.0 224.6 223.8											
Maximum energy at	24MWh in 2027 (at 10 th percentile demand forecast)											
risk												
Hours of load at	Performance Hrs in 2027 (at 10th percentile demand forecast)											
risk	2 699 (\$\N\N\b)											
Value of Customer	33,688 (\$/MWh)											
Reliability used) 2MM/b (at 10th parcentile demand for a cat)											
Expected unserved	0.2MWh (at 10 th percentile demand forecast)											
energy Cost of expected												
Cost of expected	\$5,200 (at 10 th percentile demand forecast)											
unserved energy Preferred network	Accet replacement											
solution	Asset replacement											
	2022											
Proposed timing Existing generation	One embedded generation unit over 1 MW											
at the location												
Historic use of	No net generation to TSTS during 2017											
existing generation												
Emergency transfer	55MVA for summer 2017/18											
capability												
Historic use of	Data not available											
existing transfer												
capability												
Historic load trace	350											
	300											
	250											
	0 Jan-17 May-17 Aug-17 Dec-17											
	Month											
Historic asset	75%											
utilisation												
Customer number	Number of Customers Consumption											
and type at location	Residential 79,397 61.39%											
	Commercial 4,244 30.97%											
	Industrial 201 7.53%											

	Agricultural 81 0.12%
	Station peak demand – 306MVA
Historic outage at location	No station black during last 5 years
Fault rating of	220kV – More than 22.4kA (3ph)
equipment	66kV – More than 21.8kA (3ph)
Reactive capability	One 200MVAR 220kV cap bank
of equipment	One 50MVAR 66kV cap bank
Forecast load flow	Same as load forecast in the above table
Project Name	Moorabool Terminal Station Circuit Breaker Replacement
Location of	680, Ballan Road, Moorabool
Constraint	
Element	Switching station
Constraint type	Switching constraints
Existing element	2000MVA
rating	
Load forecast	No directly connected load (switching station)
Maximum load at risk	No directly connected load (switching station)
Hours of load at risk	No directly connected load (switching station)
Value of Customer Reliability used	41,410 (\$/MWh)
Expected unserved energy	No directly connected load (switching station)
Cost of unserved	No directly connected load (switching station)
energy	
Preferred network solution	Asset replacement
Proposed timing	2023
Existing generation at the location	No directly connected generation
Historic use of	Not applicable
existing generation	
Emergency transfer capability	No directly connected load (switching station)
Historic use of existing transfer capability	Not applicable
Historic load trace	
	90 90 90 90 90 90 90 90 90 90
Historic asset utilisation	47%
Customer number and type at location	No directly connected load (switching station)
/	

Historic outage at	No station black during last 5 years
location	
Fault rating of	500kV – More than 15.3kA (3ph)
equipment	220kV – More than 23.8kA (3ph)
Reactive capability	Two 150MVAR 220kV cap banks
of equipment	Two 100MVAR 500kV reactors
	One 100MVAR 220 kV reactor
Forecast load flow	Switching station – load flow vary on the switching arrangement, generation dispatch etc.
	Switching station is expected to handle switching between 200 -1000MVA.

Project Name	MWTS 66kV 0	Circuit E	Breaker	Replac	ement								
Location of	Monash Way.	Morwe	.										
Constraint													
Element	Connection sta	ation											
Constraint type	Load at risk												
Existing element	465MVA												
rating													
Load forecast	MWTS (MVA)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027		
	Summer10	424.7	420.2	411.7	408.5	396.3	386.4	392.9	393.4	390.3	389.4	1	
	Summer50	389.9	387.3	381.3	375.2	374.3	366.6	367.8	371.5	367.2	369.2	I	
	Winter10	352.7	349.6	347.8	350.8	348.9	350.5	350.3	343.1	346.0	348.9	I	
	Winter50	343.0	338.6	337.8	342.6	340.5	340.9	341.4	335.3	336.4	337.5	1	
Maximum energy at		46MWh in 2017/18 (at 50 th percentile demand forecast)											
risk		1,315MWh in 2017/18 (at 10 th percentile demand forecast)											
Hours of load at	18.9 Hrs in 20	17/18 (at 50 th (percent	ile dem	and for	ecast)						
risk													
Value of Customer	38,863 (\$/MW	h)											
Reliability used													
Expected unserved	3.6MWh in 20	· · ·					,						
energy	8.6MWh in 20												
Cost of expected	\$0.14 million in		· ·					,					
unserved energy	\$0.33 million in		18 (at 1	0 th per	centile	demano	foreca	ist)					
Preferred network	Asset Replace	ement											
solution													
Proposed timing	2024												
Existing generation	229MW												
at the location	501 (1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		0/47										
Historic use of	59MW during			eak den	nand								
existing generation	666,513MWh												
Emergency transfer	5MVA for sum	mer 20	17/18										
capability	Dete net evel												
Historic use of	Data not availa	adie											
existing transfer													
capability													

Historic load trace	400											
	350											
	300			data 1				<u>.</u>			+	
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	01-Jan-17	02-Mar-17	0	1-May-17	30-Ju Mo	n-17 onth	29-Aug-1	7	28-Oct-17	27	-Dec-17	
Historic asset	80%											
utilisation												
Customer number		N	lumber	of Cust	tomers		Consu	mption				
and type at location	Residential		1	33,599			34.1	17%				
	Commercial			13,108			30.7	78%				
	Industrial			2,100			23.8					
	Agricultural			18,605			11.2	24%				
	Station peak de											
Historic outage at location	No station blac	k during	g last 5	years								
Fault rating of	66kV – More th	an 16.2	2kA (3p	h)								
equipment	22kV – More th	an 9.5k	kA (3ph)								
Reactive capability	No reactive ass	sets										
of equipment												
Forecast load flow	Same as load f	orecast	in the	above t	able							
Project Name	RCTS Transfor			it Break	er Rep	laceme	nt					
Location of Constraint	Pumps Road, F		TS.									
Element	Connection sta	tion										
Constraint type	Load at risk											
Existing element	220/66kV - 280)MV/A										
rating	220/22kV - 70											
Load forecast	RCTS66 (MVA)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	
	Summer10	154.5	152.8	150.3	150.4	147.7	146.4	152.0	155.9	159.0	163.4	
	Summer50	141.8	141.2	139.9	139.0	140.6	140.1	143.5	148.6	151.1	156.5	ĺ
	Winter10	89.2	89.7	90.6	93.0	94.0	96.0	97.5	97.1	99.6	100.2	ĺ
	Winter50	87.0	87.5	88.5	91.4	92.4	94.1	95.9	95.8	97.8	98.9	
												1
	RCTS22 (MVA)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	
	Summer10	51.9	53.0	53.5	54.7	54.6	54.9	57.4	59.0	60.0	61.3	
	Summer50	46.1	47.4	48.1	48.7	50.1	50.5	52.2	54.1	54.9	56.6	l
	Winter10	24.2	24.3	24.4	24.9	25.0	25.4	25.5	25.2	25.6	25.7	l
Maximum I. (Winter50	23.3	23.3	23.5	24.1	24.2	24.4	24.7	24.4	24.6	24.9	L
Maximum load at	None											
risk Hours of load at	Not applicable											
risk												
Value of Customer	66kV – 41,588	(\$/M\\\/	n)									
Reliability used	22kV - 41,624											
,	None	_,	·/									
Expected unserved												
Expected unserved energy	None											

energy												
Preferred network	Asset Replacem	ent										
solution												
Proposed timing	2024											
Existing generation	4.42MW											
at the location												
Historic use of	Data not availab	le										
existing generation												
Emergency transfer capability	23.5MVA for sun	nmer 2	017/18	}								
Historic use of existing transfer	Data not availab	le										
capability Historic load trace	250											
	200 150 100 50 0)2-Mar-17	01	-May-17		un-17 Ionth	29-Au	8-17	28-Oct	17	27-Dec 12	,
Llisteria secot												
Historic asset	57%											
utilisation		N.		-	1 a a		Cana					
Customer number		N		of Cus	tomers			sumptio	on			
and type at location	Residential 22,735 31.69%											
	Commercial			2,716				<u>5.99%</u>				
	Industrial			519				5.38%				
	Agricultural			1,992			5	.94%				
	Station peak der											
	Station peak der				kV)							
Historic outage at location	No station black	during	last 5	years								
Fault rating of	220kV – More th	an 4.0	kA (3pl	h)								
equipment	66kV – More tha		,									
	22kV – More tha	<u>n 6.</u> 5k/	A (3ph))								
Reactive capability	Two 40MVAR 22	20kV ca	ap ban	ks								
of equipment	Two 11.1MVAR											
	Two 8MVAR 22k											
	One 15MVAR 66											
Forecast load flow	Same as load for	recast	in the a	above t	able							
Project Name	KGTS B2 and B3	3 Trans	sforme	r and C	Circuit E	Breakei	r Repla	cemer	nt			
Location of	Loddon Valley H	ighway	, Kera	ng.								
Constraint				-								
Element	Connection station	on										
Constraint type	Load at risk											
Existing element	109MVA											
rating												
Load forecast	KGTS66 (MVA)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	
	Summer10	64.8	65.2	65.0	65.5	64.5	63.9	65.7	66.5	66.7	67.2	
	Summer50	57.2	57.8	57.9	57.9	58.6	58.2	59.1	60.4	60.4	61.5	

	Winter10	47.6	47.6	47.7	48.6	48.8	49.5	49.9	49.4	50.3	49.8					
	Winter50	46.4 2018	46.2 2019	46.5 2020	47.6 2021	47.8 2022	48.3 2023	48.9 2024	48.5 2025	49.2 2026	48.9 2027					
	Summer10	15.2	15.2	15.1	15.2	14.9	14.7	15.2	15.4	15.4	15.6					
	Summer50	13.3	13.5	13.3	13.3	13.4	13.2	13.5	13.7	13.7	13.9					
				11.9		12.2	12.4				12.3					
	Winter10	11.8	11.8		12.1			12.6	12.4	12.7						
Maximum anaray at	Winter50	11.3	11.3	11.3	11.7	11.7	11.9	12.1	12.0	12.2	11.8					
Maximum energy at risk	NONE															
Hours of load at	Not applicable															
risk																
Value of Customer	36,805 (\$/MWh)															
Reliability used																
Expected unserved	None															
energy																
Cost of expected	Not applicable															
unserved energy																
Preferred network	Asset Replacem	ent														
solution																
Proposed timing	2024															
Existing generation	None															
at the location																
Historic use of	Not applicable															
existing generation																
Emergency transfer	1MVA for summer 2017/18															
capability																
Historic use of	Data not availab	е														
existing transfer																
capability																
Historic load trace	90															
	80										-+++					
	70															
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					N	lonth										
Historic asset	78%															
utilisation																
Customer number		N			tomers			sumptio	on							
			4	~ ~ ~ ~			52	2.62%								
	Residential			3,202						—						
and type at location	Residential Commercial			3,202 2,112).49%								
				2,112 447			30 1	.97%								
	Commercial			2,112			30 1									
	Commercial Industrial	nand –		2,112 447 2,214			30 1	.97%								
and type at location	Commercial Industrial Agricultural Station peak der		70.3M	2,112 447 2,214 W			30 1	.97%								
	Commercial Industrial Agricultural		70.3M	2,112 447 2,214 W			30 1	.97%								
and type at location Historic outage at location	Commercial Industrial Agricultural Station peak der No station black	during	70.3M last 5	2,112 447 2,214 W years			30 1	.97%								
and type at location Historic outage at	Commercial Industrial Agricultural Station peak der	during an 3.1	70.3M last 5 kA (3pt	2,112 447 2,214 W years			30 1	.97%								

Reactive capability of equipment	Two 15MVAR 66kV cap banks One 5.9MVAR 22kV cap bank
	One 19.4 MVAR 66kV reactor
Forecast load flow	Same as load forecast in the above table

Project Name	TTS B4 Transf	former	and 66	kV Circi	uit Brea	ker Re	placem	ent						
Location of	15, High Stree	t, Thon	nastowi	٦.										
Constraint														
Element	Connection sta	ation												
Constraint type	Load at risk													
Existing element	750MVA													
rating	 			1				1	1	1	1			
Load forecast	TTS (MVA)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027			
	Summer10	549.8	552.5	553.4	545.7	542.4	543.0	544.9	553.0	549.4	551.0			
	Summer50	503.9	506.9	508.9	500.4	499.2	501.8	501.1	507.9	505.8	508.0			
	Winter10	420.1	423.2	426.3	421.6	421.1	425.5	425.6	430.1	434.2	438.4			
	Winter50	409.6	412.3	415.8	411.0	410.1	414.2	414.3	418.9	422.3	425.8			
Maximum energy at	None										·			
risk														
Hours of load at	Not applicable													
risk														
Value of Customer	40,028 (\$/MW	h)												
Reliability used														
Expected unserved	None													
energy														
Cost of expected	Not applicable	Not applicable												
unserved energy														
Preferred network	Asset replacer	Asset replacement												
solution	•													
Proposed timing Existing generation	2025 20MW													
at the location	2010100													
Historic use of	25,895MWh in	2017												
existing generation	25,0551010011111	2017												
Emergency transfer	67.2MVA for s	ummer	2017/1	8										
capability			2011/1	U										
Historic use of	Data not availa	able												
existing transfer														
capability														
Historic load trace	450													
	400										1			
	350		1								<u> </u>			
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	01-Jan-17	02-Mar-17		01-May-17		un-17 Ionth	29-Aug-	17	28-Oct-17	2	?7-Dec-17			
Historic asset	54%													
utilisation														
Customer number			Numhe	r of Cu	stomers		Cons	umptior	<u>ו</u> ו					
and type at location	Residential			147,803		,		.12%	<u>.</u>					
	rtosidential			147,000	,		52	. 1 2 /0						

	Commercial	14,143	48.29%										
	Industrial	1,270	19.59%										
	Agricultural	11	0.00%										
	Station peak dem	tation peak demand – 428.3MVA											
Historic outage at	No station black	lo station black during last 5 years											
location													
Fault rating of	220kV – More that	220kV – More than 26.1kA (3ph)											
equipment	66kV – More that	n 15.6kA (3ph)											
Reactive capability	Two 200MVAR 2	20kV cap banks											
of equipment	Three 50MVAR 6	66kV cap banks											
Forecast load flow	Same as load for	recast in the above table											

Project Name	FBTS B3 Trar	sforme	r and C	ircuit B	reaker	Replace	ement					
Location of	132-140, Turn	er Stre	et, Fish	ermens	Bend							
Constraint												
Element	Connection sta	ation										
Constraint type	Load at risk											
Existing element rating	450MVA											
Load forecast	FBTS (MVA)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	
	Summer10	327.2	329.3	329.6	333.8	330.6	328.8	340.8	347.6	351.3	356.7	
	Summer50	298.5	301.5	302.9	304.0	309.2	308.7	315.5	324.4	326.3	333.7	
	Winter10	245.7	250.1	254.3	262.5	267.2	274.5	280.7	281.5	290.2	297.1	
	Winter50	228.8	232.6	237.0	246.2	250.5	256.7	263.1	264.5	271.6	279.2	
Maximum energy at risk	None											
Hours of load at risk	Not applicable	Not applicable										
Value of Customer Reliability used	46,914 (\$/MW	46,914 (\$/MWh)										
Expected unserved energy	None											
Cost of unexpected unserved energy	Not applicable	•										
Preferred network solution	Asset Replace	ement										
Proposed timing	2024											
Existing generation at the location	15.81MW											
Historic use of existing generation	Data not avail	able										
Emergency transfer capability	22MVA for su	mmer 2	017/18									
Historic use of existing transfer capability	Data not avail	able										

Historic load trace	300										-				
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	0														
	0 01-Jan-17	02-Mar-17	0:	I-May-17	30-Jun	-17	29-Aug-17	2	8-Oct-17	27-De					
					Mor	nth									
Historic asset	63%														
utilisation															
Customer number			Numbe	r of Cu		5			١						
and type at location		Residential 30,833 12.01% Commercial 6,820 83.19%													
		ndustrial 328 4.80% Agricultural - 0.00% tation peak demand – 273.7MW o station black during last 5 years													
Historic outage at															
location															
Fault rating of	220kV – More	0kV – More than 25.2kA (3ph)													
equipment		V – More than 21.8kA (3ph)													
Reactive capability		le 200MVAR 220kV cap bank													
of equipment		•													
Forecast load flow	Same as load	Same as load forecast in the above table													
Project Name		RWTS B3 Transformer Replacement													
Location of	59 – 61, Heath	nerdale	Road,	Ringwo	od.										
Constraint		<u>.</u>													
Element	Connection sta	ation													
Constraint type	Load at risk 220/66kV – 60														
Existing element rating	220/00kV - 00 220/22kV - 15														
Load forecast	RWTS66														
	(MVA)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027				
	Summer10	524.9	522.2	517.1	516.8	508.7	503.4	514.8	522.5	525.2	528.3				
	Summer50	454.0	452.4	448.0	443.5	444.7	440.9	443.9	451.9	451.6	457.0				
	Winter10	361.8	357.9	354.9	355.7	352.5	352.4	351.3	344.9	346.3	347.6				
	Winter50	352.0	347.3	344.6	346.8	343.2	342.0	341.3	335.7	335.5	335.2				
	RWTS22														
	(MVA)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027				
	Summer10	91.8	91.1	89.9	88.7	86.9	85.9	86.9	87.7	87.8	87.5				
	Summer50	82.5	82.3	81.2	79.7	79.2	78.5	78.4	79.2	78.8	79.2				
	Winter10	66.7	66.4	66.1	66.5	66.1	66.5	66.7	66.4	67.1	67.7				
	Winter50	62.8	62.4	62.2	62.7	62.4	62.5	62.8	62.5	62.9	63.3				
Maximum energy at risk	None														
Hours of load at risk	Not applicable	!													
Value of Customer	66kV – 37,119) (\$/MV	/h)												
Reliability used	22kV – 38,738		,												
Expected unserved	None	, :													
energy															
	1														

Cost of expected	Not applicable		
unserved energy			
Preferred network	Asset Replaceme	ent	
solution			
Proposed timing	2024		
Existing generation	None		
at the location			
Historic use of	Not applicable		
existing generation			
Emergency transfer	49.6MVA for sum	umer 2017/18	
capability			
Historic use of	Data not available	0	
existing transfer			
capability			1
Historic load trace	600		
	500		
	400	A	CALLAR AL
	¥ 300	I BALL I LAWR AND A BARM	
	2.00	New York Contraction of the second	
	200 -	الم المعالم المناطقة الم	and a data set of the
	Phillipson Pre-		The second s
	100		
	0	- , · · · ·	
	01-Jan-17 0	2-Mar-17 01-May-17 30-Jun-17 Month	29-Aug-17 28-Oct-17 27-Dec-17
	Note: Cog in Aug	ust is due to CGU/ data arran	
Llisterie seest	• •	ust is due to 66kV data error.	
Historic asset	71%		
utilisation			
Customer number		Number of Customers	Consumption
and type at location	Residential	180,988	45.35%
	Commercial	13,575	37.79%
	Industrial	2,776	15.60%
	Agricultural	1,892	1.27%
	Station peak dem	nand – 445.3MVA (66kV)	
	Station peak dem	nand – 86.5MVA (22kV)	
Historic outage at		during last 5 years	
location		J j	
Fault rating of	220kV – More tha	an 21.4kA (3ph)	
equipment	66kV – More than		
	22kV – More than		
Reactive capability	One 200MVAR 2		
of equipment	Two 50MVAR 66	•	
	Two 12MVAR 22	•	
Forecast load flow		ecast in the above table	
Draig at Mara			ement Stage 2
Project Name		500kV Circuit Breaker Replac	cement Stage 2
Location of	Bartons Ln, Trara	•	
Constraint		bad, Hazelwood North	
Element		ction station (LYPS), Switching	g station (HWTS)
Constraint type	Switching/ generation		
Existing element	HWTS - 2400MV	Α	
rating	LYPS - 4000MV	4	
Load forecast	No directly conne	ected load (switching station)	
Maximum load at		ected load (switching station)	

risk	
Hours of load at	No directly connected load (switching station)
risk	
Value of Customer	41,410 (\$/MWh)
Reliability used	
Expected unserved	No directly connected load (switching station)
energy	
Cost of unserved	No directly connected load (switching station)
energy	
Preferred network	Asset replacement
solution	
Proposed timing	2024
Existing generation	LYPS – Scheduled generation - LYPA , LYPB, LYGS & BLLY
at the location	HWTS - None
Historic use of	LYPS – Market participant (scheduled generation)
existing generation	HWTS- Not applicable
Emergency transfer	Not applicable
capability	
Historic use of	Not applicable
existing transfer	
capability	
Historic load trace	4000
	500
	01-Jan-17 02-Mar-17 01-May-17 30-Jun-17 29-Aug-17 28-Oct-17 27-Dec-17 Month
	Note: Sags are due to data errors.
Historic asset	63%
utilisation	
Customer number	No directly connected load (switching station)
and type at location	
Historic outage at	No station black during last 5 years
location	
Fault rating of	LYPS
equipment	500kV – More than 22.6kA (3ph)
	66kV – More than 13.0kA (3ph)
	HWTS
	500kV – More than 22.6kA (3ph)
	220kV – More than 16.3kA (3ph)
Reactive capability	Not applicable
of equipment	
Forecast load flow	Switching station – load flow vary on the switching arrangement, generation dispatch etc.
	Switching station is expected to handle switching between 1000 -3600MVA
Project Name	GTS B4 Transformer and 66kV Circuit Breaker Replacement
Location of	362, Anakie Road, Geelong.
Constraint	

Constraint Element

Connection station

Constraint type	Load at risk													
Existing element	600MVA													
rating														
Load forecast	GTS 1-2 (MVA)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027			
	Summer10	203.3	204.5	203.9	205.5	202.9	201.3	207.3	210.4	211.9	214.2			
	Summer50	182.2	183.9	184.0	184.1	186.4	185.6	188.9	193.2	193.7	197.3			
	Winter10	169.6	170.6	172.2	176.5	178.4	182.0	184.8	184.2	188.6	187.8			
	Winter50	163.2	163.9	165.6	170.6	172.3	175.2	178.3	178.0	181.4	181.1			
	GTS 3-4 (MVA)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027			
	Summer10	317.5	316.5	312.9	312.8	306.7	302.1	308.1	310.1	309.7	310.6			
	Summer50	270.4	270.2	267.8	265.4	266.2	262.6	264.6	268.1	266.4	268.7			
	Winter10	207.5	206.9	206.9	209.7	209.7	211.9	213.0	209.9	212.9	216.5			
	Winter50	198.4	196.9	197.5	201.2	201.1	202.4	203.9	201.3	203.2	207.3			
Maximum energy at	None				-	-	-							
risk														
Hours of load at	Not applicable													
risk		<u>,</u>												
Value of Customer	42,205 (\$/MWh)												
Reliability used Expected unserved	None													
energy	NOTE													
Cost of expected	Not applicable	Not applicable												
unserved energy	Not applicable													
Preferred network	Asset Replacement													
solution														
Proposed timing	2024													
Existing generation	25.7MW													
at the location	D () ()													
Historic use of	Data not availa	ble												
existing generation Emergency transfer	6.7MVA for sur	nmor 21	017/18											
capability			017/10											
Historic use of	Data not availa	ble												
existing transfer														
capability														
Historic load trace	450													
	400													
	350			4.444	Added	l data	t nes				. 1			
			11.10	ייין,	1		1 4 1	14						
	¥ ²⁵⁰ 200 -		eder -		•••••			1						
	150	NN BAA	ality of the Prov	, and the second	1.1.1.1.1		APAGE 1	19 P		11111111111111111111111111111111111111				
	100							- 1 ¹⁷ 1						
	50													
	0 01-Jan-17	02-Mar-17	0	1-May-17		un-17	29-Aug-	17	28-Oct-17	2	27-Dec-17			
		<u> </u>				onth								
I Batavia	Note: Sags afte	er Septe	ember a	are due	to B2 d	ata erro	ors.							
Historic asset	68%													
utilisation Customer number		N	lumber	of Cure	tomoro	l	Conor	motion	<u> </u>					
and type at location	Residential			33,625	UNEIS			mption 97%						
	Commercial	-		<u>9,725</u>				10%						
	Industrial			1,426				<u>3%</u>						
	induotnai			ı, r ∠ ∪			۲.۱	• /0						

	Agricultural			994			0.5	0%					
	Station peak de	emand -	- 406.5	MVA									
Historic outage at	No station blac	k during	g last 5	years									
location													
Fault rating of	220kV - More	than 22	.0kA (3	ph)									
equipment	66kV – More th	nan 15.3	3kA (3p	h)									
Reactive capability	One 50MVAR	66kV ca	ip bank										
of equipment	One 25MVAR	66kV ca	ip bank										
Forecast load flow	Same as load f	forecast	in the	above t	able								
Project Name	BLTS 220kV, 6	6kV an	d 22kV	Circuit	Breake	r Repla	cemen	t					
Location of	70 – 84, Kyle F	Road, Bi	rooklyn										
Constraint		Connection station											
Element	Connection sta	onnection station											
Constraint type	Load at risk												
Existing element	220/66kV - 450	20/66kV - 450MVA											
rating	220/22 – 150M	20/22 – 150MVA											
Load forecast	ATS-BLTS66												
	(MVA)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027		
	Summer10	317.0	338.5	351.8	351.6	342.2	341.2	346.1	351.0	350.9	353.0		
	Summer50	290.7	312.6	326.8	325.1	319.9	320.1	322.3	327.8	327.6	331.1		
	Winter10	284.4	316.6	319.8	323.0	318.1	322.6	325.0	325.7	330.3	333.9		
	Winter50	267.4	299.0	302.4	305.8	300.6	304.4	306.9	307.9	311.4	315.2		
	BLTS22												
	(MVA)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027		
	Summer10	84.6	83.6	82.1	81.6	79.9	78.5	79.7	80.2	80.2	80.6		
	Summer50	72.4	71.7	70.6	69.6	69.6	68.4	68.9	69.9	69.7	70.5		
	Winter10	67.1	67.3	67.8	69.3	69.8	71.2	72.1	71.6	73.2	73.7		
	Winter50	66.2	66.3	66.8	68.7	69.2	70.2	71.2	71.0	72.2	72.8		
Maximum energy at risk	None												
Hours of load at	Not applicable												
risk													
Value of Customer	66kV – 43,147	(\$/MWł	า)										
Reliability used	22kV – 48,171	(\$/MWł	า)										
Expected unserved	None										_		
energy													
Cost of expected	Not applicable												
unserved energy													
Preferred network	Asset Replace	ment											
solution													
Proposed timing	2025												
Existing generation	51.2MW												
at the location	.												
Historic use of	Data not availa	ble											
existing generation	5450 (5.5		4-11-										
Emergency transfer capability	54MVA for sum	nmer 20	1//18										
Historic use of	Data not availa	ble											
existing transfer													
capability													

Historic load trace	450													
	350		1		le se t									
	300	it i t		444			lite		ul ai .					
	200 - 11 J	4444	NY I		, A.						AH -			
	150				1.66				1111	****	· •			
	50													
	0 01-Jan-17	02-Mar-17	7	01-May-17		Jun-17	29-Aug	-17	28-Oct-17	:	27-Dec-17			
Llistoria secot	<u>C00/</u>				1	Month								
Historic asset utilisation	68%													
Customer number			Numbe	r of Cu	stomers	;	Consi	umptior	1					
and type at location	Residential			71,482				.62%						
	Commercial			5,007				.76%						
	Industrial			1,858				.05%						
	Agricultural	lomand	3071	239	<i>L</i> \/\		0.:	57%						
		on peak demand –307MVA (66kV) on peak demand –68.7MVA (22kV)												
Historic outage at	No station bla				/									
location	00011/		<u> </u>	<u> </u>										
Fault rating of	220kV – More													
equipment		<v (3ph)<="" 19.8ka="" more="" td="" than="" –=""></v>												
Reactive capability		2kV – More than 14.3kA (3ph) Dne 200MVAR 220kV cap bank												
of equipment		THE ZUDIVIVAR ZZUKV GAP DATIK												
Forecast load flow	Same as load	forecas	st in the	above	table									
Project Name	KTS A2, A3 a	$d \Delta 1 5$	00/220	k\/ and	B/ 220	/66k\/ -	Transfo	rmor R	nlacon	oont				
Location of	Dodds Road,		00/220	kv allu	D4 220		11411510		spiacei					
Constraint	20000110000,													
Element	Switching stat	ion/Cor	nnectior	n statior	I									
Constraint type	Load at risk													
Existing element	500/220kV - 2		/A											
rating Load forecast	220/66kV – 75		2010	2020	2024	2022	2022	2024	2025	2026	2027			
	KTS (MVA) Summer10	2018 595.9	2019 605.3	2020 613.3	2021 615.5	2022 620.6	2023 625.9	2024 637.5	2025 652.8	2026 656.5	2027 665.4			
	Summer50	529.1	537.9	546.0	545.6	554.4	561.0	567.6	581.5	585.2	594.7			
	Winter10	446.6	454.3	463.4	467.9	475.7	485.8	492.0	499.4	509.9	518.1			
	Winter50	417.7	424.5	434.1	438.9	446.1	455.5	461.8	469.3	478.4	487.0			
Maximum energy at	7.7MWh in 20											1		
risk														
Hours of load at risk														
Value of Customer	38,752 (\$/MW	′h)												
Reliability used	00,7 02 (¢/1117	"')												
Expected unserved	0.1MWh in 20	18 (at 1	0 th per	centile o	demand	foreca	st)							
energy														
Cost of expected	\$3,230 (at 10 ^t	^h percei	ntile de	mand fo	orecast)									
unserved energy Preferred network	Accot Donlog	mont												
solution	Asset Replace	- IICIII												

F . i.e.	014)/4											
Existing generation	8MVA											
at the location Historic use of	Data Not availab											
	Data Not availab											
existing generation	62N/V/A for ouron	62MVA for summer 2017/18										
Emergency transfer capability			1//10									
Historic use of	Data not availab	le										
existing transfer												
capability												
Historic load trace	700 600 500 400 300 200 100				,1/) / 							
	0 01-Jan-17	02-Mar-17	0:	1-May-17		Jun-17 Month	29-A	ug-17	28-00	:t-17	27-Dec-	17
Historic asset utilisation	78%]
Customer number		Ni	Imper	of Cus	tomers		Cons	sumptio	n			
and type at location	Residential			19,521				3.40%				
	Commercial			6,934				7.22%				
	Industrial			1,590				1.26%				
	Agricultural			572				.12%				
	Station peak der	nand –	603.9	MVA		I						
Historic outage at location	No station black											
Fault rating of	500kV – More th	an 18.2	2kA (3r	oh)								
equipment	220kV – More th											
	66kV – More tha		• • •									
Reactive capability	One 200MVAR 2	220kV (cap ba	nk								
of equipment	Two 50MVAR 66											
Forecast load flow	Same as load for	recast	in the a	above t	able							
Project Name	WOTS 330kV an			it Brea	ker Re	placem	nent					
Location of	Whytes Road, W	odong	а.									
Constraint	Connection stati	20										
Element Constraint type	Connection station Load at risk	JII										
Existing element	150MVA											
rating												
Load forecast	WOTS66 (MVA)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	
	Summer10	58.0	56.5	54.4	53.0	50.5	48.3	48.2	47.2	46.0	45.0	
	Summer10 Summer50	58.0	56.5	54.4	49.3	48.2	48.3	48.2 45.4	47.2	46.0	45.0	
	Winter10	40.3	38.9	37.7	49.3 37.3	48.2 36.4	36.0	45.4 35.6	45.0 34.6	43.6 34.7	42.9 34.8	
	Winter50	39.2	37.7	36.6	36.4	35.5	35.0	34.7	33.8	33.7	33.7	
	WOTS22 (MVA)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	
	Summer10	38.1	38.7	38.9	39.7	39.5	39.5	41.1	42.2	42.8	43.7	
	Summer50	34.8	35.5	35.9	36.2	37.1	37.3	38.3	39.6	40.1	41.2	
	Winter10	31.7	32.4	33.1	34.3	35.1	36.1	36.9	37.0	38.1	39.2	

	Winter50	31.0 31.5 32.3 33.7	34.4	35.3 36.2	36.3 37.2	38.1				
Maximum energy at		18 (at 50 th percentile dem			30.3 37.2	30.1				
risk ¹		· ·		,						
Hours of load at	19 Hrs in 2017/18	59MWh in 2017/18 (at 50 th percentile demand forecast)								
risk										
Value of Customer Reliability used	41,205 (\$/MWh)									
Expected unserved	0.2MWh in 2017/	18 (at 50 th percentile den	hand fore	ecast)						
energy		18 (at 50 th percentile den								
Cost of expected		ercentile demand forecas								
unserved energy		10 th percentile demand fo								
Preferred network	Asset Replaceme	ent	·							
solution										
Proposed timing	2025									
Existing generation	58MVA									
at the location										
Historic use of	19,161.6MWh									
existing generation		0017/10								
Emergency transfer capability	1MVA for summe	er 2017/18								
Historic use of	Data not availabl	е								
existing transfer										
capability										
Historic load trace	100									
	80									
	40 30 20	den de linne litte	1111							
	10									
		2-Mar-17 01-May-17 3	0-Jun-17 Month	29-Aug-17	28-Oct-17	27-Dec-17				
Historic asset	58%									
utilisation	0070									
Customer number		Number of Customer	S	Consumptio	on					
and type at location	Residential	21,669		28.48%						
	Commercial	2,382		35.75%						
	Industrial	196		29.73%						
	Agricultural	2,638		6.03%						
	Station peak dem	nand –88.2MVA	· · ·							
Historic outage at	No station black	during last 5 years								
location										
Fault rating of		an 10.1.4kA (3ph)								
equipment	66kV – More that	、 、 、 、 、								
Desettion 1999	22kV – More that									
Reactive capability of equipment	One 150MVAR 3	JUKV CAP bank								
Forecast load flow	Same as load for	ecast in the above table								
Project Name		Breaker Replacement								

¹ Assuming no generation from Hume power station (HPS). No energy at risk with HPS generating at full capacity to WOTS. HPS can generate either to WOTS or Jindera (NSW).

Location of	Bartons Ln, Traralgon
Constraint	Banons En, Traraigon
Element	Switching station
Constraint type	Load at risk
Existing element	No transformers
rating	
Load forecast	No directly connected load (switching station)
Maximum load at	No directly connected load (switching station)
risk	No directly connected load (Switching Station)
Hours of load at	No directly connected load (switching station)
risk	No directly connected load (switching station)
Value of Customer	41,410 (\$/MWh)
Reliability used	
Expected unserved	No directly connected load (switching station)
energy	No directly connected load (switching station)
Cost of unserved	No directly connected load (switching station)
	No directly connected load (switching station)
energy Preferred network	Asset Replacement
solution	
	2025
Proposed timing Existing generation	None
at the location	
Historic use of	Not applicable
	Not applicable
existing generation	No directly connected load (switching station)
Emergency transfer	No directly connected load (switching station)
capability Historic use of	No directly connected load (switching station)
	No directly connected load (switching station)
existing transfer capability	
Historic load trace	40.0 ,
	35.0
	30.0
	0.0
	Month
Historic asset	43%
utilisation	
Customer number	No directly connected load (switching station)
and type at location	
Historic outage at	No station black during last 5 years
location	
Fault rating of	
equipment	
Reactive capability	Two 30MVAR 66kV cap banks
of equipment	
Forecast load flow	Expected to be between 5-35MVA
Project Name	TSTS B3 Transformer Replacement
Location of	630 - 658, Blackburn Road, Templestowe
Constraint	

Element	Connection s	tation									
Constraint type	Load at risk										
Existing element	450MVA										
rating											
Load forecast	TSTS (MVA)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
	Summer10	377.3	377.6	377.0	374.5	371.3	369.9	374.1	379.7	380.5	380.9
	Summer50	328.3	330.0	329.2	325.6	325.7	325.4	325.2	329.5	328.9	331.1
	Winter10	241.5	240.2	239.5	238.1	236.7	236.2	234.6	233.5	233.5	232.7
	Winter50	233.9	232.3	231.8	230.5	228.6	227.9	226.4	225.0	224.6	223.8
Maximum energy at	24MWh in 20							220.1	223.0	22 110	223.0
risk											
Hours of load at risk	2 Hrs in 2027	' (at 10	th perce	entile de	emand f	orecast	t)				
Value of Customer	33,688 (\$/M\	Vh)									
Reliability used											
Expected unserved	0.2MWh (at '	10 th per	centile	deman	d foreca	ast)					
energy		146			<u>,</u>	1)					
Cost of expected	\$5,200 (at 10	perce	entile d	emand	torecas	st)					
unserved energy Preferred network	Asset replace	amont									
solution		SILICIT									
Proposed timing	2025										
Existing generation	One embedd	ed gen	eration	unit ov	er 1 MV	V					
at the location		Ū									
Historic use of	No net gener	No net generation to TSTS during 2017									
existing generation											
Emergency transfer capability	55MVA for s	55MVA for summer 2017/18									
Historic use of	Data not ava	ilable									
existing transfer											
capability	350										
Historic load trace	330										
	300										
	250										HT.
	200		-,∭	t all		ahlah	14. <u>i</u> h	h.,			
	MWA			U. P. Y	W						
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	50										
	o —							1			
	Jan-17			May-17		Month	Au	g-17			Dec-17
Historic asset	75%					Month					
utilisation											
Customer number			Numb	er of C	ustome	rs	Con	sumptio	on		
and type at location	Residential			79,39			6	1.39%			
	Commercia			4,24	4			0.97%			
	Industrial			201				7.53%			
	Agricultural			81			().12%			
	Station peak										
Historic outage at location	No station bl		•	•	S						
Fault rating of	220kV – Mor	e than	22.4kA	(3ph)							

equipment	66kV – More than 21.7kA (3ph)
Reactive capability	One 200MVAR 220kV cap bank
of equipment	One 50MVAR 66kV cap bank
Forecast load flow	Same as load forecast in the above table

Project Name	ROTS 220kV Circuit Breaker Replacement
Location of	890, Wellington Road, Rowville.
Constraint	
Element	Switching station
Constraint type	Load at risk
Existing element	2000MVA
rating	
Load forecast	No directly connected load (switching station)
Maximum load at	No directly connected load (switching station)
risk	
Hours of load at	No directly connected load (switching station)
risk	
Value of Customer	41,410 (\$/MWh)
Reliability used	
Expected unserved	No directly connected load (switching station)
energy	
Cost of unserved	No directly connected load (switching station)
energy	
Preferred network	Asset replacement
solution	
Proposed timing	2025
Existing generation	No directly connected generation
at the location	
Historic use of	Not applicable
existing generation	
Emergency transfer	No directly connected load (switching station)
capability	
Historic use of	Not applicable
existing transfer	
capability	
Historic load trace	2500
	2000
	1500
	01-Jan-17 02-Mar-17 01-May-17 30-Jun-17 29-Aug-17 28-Oct-17 27-Dec-17
	Month
Historic asset	99%
utilisation	
Customer number	No directly connected load (switching station)
and type at location	
Historic outage at	No station black during last 5 years
location	
Fault rating of	500kV – More than 18.4kA (3ph)
equipment	220kV – More than 26.2kA (3ph)

Reactive capability	Three 200MVAR 220kV cap banks
of equipment	
Forecast load flow	Switching station – load flow vary on the switching arrangement, generation dispatch etc.
	Switching station is expected to handle switching between 200 -1500MVA.

Project Name	ERTS Redeve	lopmer	nt - Stag	ge 2								
Location of Constraint	Police Road, Rowville.											
Element	Connection station											
Constraint type	Load at risk											
Existing element	600MVA											
rating				1						1	1	1
Load forecast	ERTS (MVA)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	_
	Summer10	488.7	491.1	492.7	490.8	490.7	494.1	504.6	518.2	527.1	530.6	_
	Summer50	446.1	451.8	452.4	450.3	452.4	457.8	462.1	473.3	480.1	487.5	
	Winter10	382.3	385.9	389.9	392.4	394.3	398.1	403.7	409.2	414.6	418.8	
	Winter50	378.3	381.4	384.9	387.3	388.7	392.2	397.4	402.7	407.9	411.5	
Maximum energy at risk	None											
Hours of load at risk	Not applicable											
Value of Customer Reliability used	37,376 (\$/MW	h)										
Expected unserved energy	None											
Cost of expected	Not applicable											
unserved energy												
Preferred network	Asset Replace	ment										
solution												
Proposed timing	2026											
Existing generation	16.6MW											
at the location			040/47									
Historic use of	11.6MW during	g the 20	J16/17	реак а	emand							
existing generation Emergency transfer	103MVA for su	immor	2017/1	<u>8</u>								
capability			2017/1	0								
Historic use of	Data not availa	able										
existing transfer capability												
Historic load trace	500 450 400 350 250 200 150 0 100 50 0 01-lan-17	02-Mar-17		D1-May-17		n-17 onth	29.Aug-1	7	28-0ct-17	27	-Dec-17	
Historic asset utilisation	74%											
Customer number				r of Cu		5		umptior	I			_
and type at location	Residential			114,106	6		43	.98%				

	Commercial	8,764	42.25%							
	Industrial	1,146	13.41%							
	Agricultural	429	0.35%							
	Station peak den	ation peak demand – 453.4MVA								
Historic outage at	No station black	during last 5 years								
location										
Fault rating of	220kV – More th	220kV – More than 28.5kA (3ph)								
equipment	66kV – More tha	66kV – More than 16.0kA (3ph)								
Reactive capability	Four 50MVAR 66	SkV cap banks								
of equipment										
Forecast load flow	Same as load for	recast in the above table								

Project Name	SMTS 330/22	SMTS 330/220kV Transformer Replacement - Stage 2										
Location of	385, McDonal	385, McDonalds Road, South Morang.										
Constraint		-										
Element	Switching stat	Switching station/ Connection station										
Constraint type	Load at risk											
Existing element	500/330kV – 1											
rating	330/220kV – 1		Ά									
	220/66kV - 45	50MVA	r	1		1	1	r	1	1		
Load forecast	SMTS (MVA)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	
	Summer10	327.9	336.1	343.4	348.4	353.8	359.0	363.5	369.3	372.6	376.9	
	Summer50	299.4	305.9	311.8	315.6	319.9	324.7	328.3	333.1	336.4	340.4	
	Winter10	238.0	243.5	247.0	255.5	261.3	261.6	263.1	263.8	268.4	276.0	
	Winter50	232.0	236.7	240.7	249.8	255.2	255.0	256.8	257.9	261.4	269.6	
Maximum energy at	1,712MWh in											
risk	4,943MWh in	2026/27	7 (at 10	th perce	ntile de	emand f	orecast	t)				
Hours of load at												
risk												
Value of Customer	38,008 (\$/MW	h)										
Reliability used												
Expected unserved	7MWh in 2026	· ·	•				,					
energy	21MWh in 202											
Cost of expected	\$0.28 million i		· ·					,				
unserved energy	\$0.81 million in		27 (at 1	0 th per	centile	demano	d foreca	ist)				
Preferred network	Asset Replace	ement										
solution	0000											
Proposed timing	2023											
Existing generation	150MW											
at the location Historic use of	80,800MWh ir	0017										
existing generation		12017										
Emergency transfer	33MVA for su	mmor 🤈	017/18									
capability			017/10									
Historic use of	Data not avail	able										
existing transfer												
U U												
capability												

Historic load trace	300											
	250											
	250											
	200			hund	th th			1	1	Ь	t	
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	01-Jan-17	02-Mar-17	C	1-May-17	30-Ju Mo	n-17 m th	29-Aug-17		28-Oct-17	27-D	ec-17	
Historic asset	59%											
utilisation												
Customer number			Numbe	r of Cu	stomers	;	Consi	umptior	۱			
and type at location	Residential			101,342	2			.57%				
	Commercial			6,671			43.	.07%				
	Industrial			688			10.	.38%				
	Agricultural			3,068			2.9	98%				
	Station peak of	lemand	-264.7	,					ı			
Historic outage at	No station bla											
location			-	-								
Fault rating of	500kV – More	than 2	0.2kA (3ph)								
equipment	330kV – More	than 19	9.2kA (3ph)								
	220kV – More	than 2	1.6kA (3ph)								
	66kV – More t	66kV – More than 21.3kA (3ph)										
Reactive capability	Two 186MVA	Two 186MVAR 330kV series cap banks (on DDTS 1 & 2 lines)										
of equipment		· · · · · · · · · · · · · · · · · · ·										
Forecast load flow	Same as load	forecas	st in the	above	table							
Project Name	TBTS B1 and			er Repla	acemen	t						
Location of	21, Thornell La	ane, Iy	abb.									
Constraint	O and a sting of	- 1'										
Element	Connection st	ation										
Constraint type	Load at risk											
Existing element	450MVA											
rating												
Load forecast	TBTS (MVA)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	
	Summer10	313.1	310.4	310.9	309.5	312.3	317.9	323.8	334.3	341.4	343.4	
	Summer50	281.6	279.1	279.6	278.4	280.9	285.9	291.2	300.7	307.1	308.8	
	Winter10	208.1	210.8	213.3	215.4	217.6	220.5	224.0	227.6	231.1	234.5	
	Winter50	205.3	207.9	210.1	212.0	214.1	216.8	220.0	223.4	226.6	229.8	
Maximum energy at	5MWh in 2027	' (at 10 ^t	th perce	ntile de	mand f	orecast)					
risk												
Hours of load at	2 Hrs in 2017											
risk												
	31,588 (\$/MWh)											
Value of Customer	31,588 (\$/MW	, (*//										
Reliability used		,										
Reliability used Expected unserved	31,588 (\$/MW 0.03MWh in 2	,	10 th pe	rcentile	demar	d forec	ast)					
Reliability used Expected unserved energy	0.03MWh in 2	027 (at	•									
Reliability used Expected unserved energy Cost of expected		027 (at	•									
Reliability used Expected unserved energy Cost of expected unserved energy	0.03MWh in 2 \$1,000 in 202	027 (at 7 (at 10	•									
Reliability used Expected unserved energy Cost of expected unserved energy Preferred network	0.03MWh in 2	027 (at 7 (at 10	•									
Reliability used Expected unserved energy Cost of expected unserved energy	0.03MWh in 2 \$1,000 in 202	027 (at 7 (at 10	•									

Existing generation	3MW
at the location	
Historic use of	Data not available
existing generation	
Emergency transfer	22MVA for summer 2017/18
capability	
Historic use of	Data not available
existing transfer	
capability	
Historic load trace	
Listoria coast	01-Jan-17 02-Mar-17 01-May-17 30-Jun-17 29-Aug-17 28-Oct-17 27-Dec-17 Month
Historic asset utilisation	60%
Customer number	
	Number of Customers Consumption Desidential 409.555 72.49%
and type at location	Residential 108,555 73.18% Operating in the second secon
	Commercial 5,534 24.06%
	Industrial 417 2.76%
	Agricultural 0.00%
	Station peak demand –279MVA
Historic outage at	No station black during last 5 years
location	
Fault rating of	220kV – More than 15.0kA (3ph)
equipment	66kV – More than 18.5kA (3ph)
Reactive capability	One 50MVAR 66kV cap banks
of equipment	
Forecast load flow	Same as load forecast in the above table
Project Name	YPS 220kV Circuit Breaker Replacement Stage 2
Location of	Station Close, Yallourn.
Constraint	
Element	Generator connection station, Switching station
Constraint type	Switching/ generation constraints
Existing element	1,480MVA
rating	
Load forecast	No directly connected load (switching station)
Maximum load at	No directly connected load (switching station)
risk	
Hours of load at	No directly connected load (switching station)
risk	
Value of Customer	41,410 (\$/MWh)
Reliability used	עווע אוו אוו אין די דע (אווע אוו)
Expected unserved	No directly connected load (switching station)
energy	
Cost of unserved	No directly connected load (switching station)
energy	

Preferred network solution Asset Replacement Proposed timing 2026 Existing generation at the location YPS – Scheduled generation (Market participant) Historic use of existing generation YPS – Scheduled generation (Market participant) Emergency transfer capability Not applicable Historic load trace Image: Capability for the second se
Proposed timing 2026 Existing generation at the location YPS – Scheduled generation (Market participant) Historic use of existing generation YPS – Scheduled generation (Market participant) Emergency transfer capability Not applicable Historic load trace Not applicable
Existing generation at the location YPS – Scheduled generation (Market participant) Historic use of existing generation YPS – Scheduled generation (Market participant) Emergency transfer capability Not applicable Historic use of existing transfer capability Not applicable Historic load trace 18000 190000 19000 19000 19000 19000 19000 1900
at the location YPS – Scheduled generation (Market participant) Historic use of existing generation Not applicable Istoric use of existing transfer capability Not applicable Historic load trace 10000 Istoric load trace 10000
Historic use of existing generation YPS – Scheduled generation (Market participant) Emergency transfer capability Not applicable Historic use of existing transfer capability Not applicable Historic load trace 1800.0 Image: state of transfer capability 1800.0 Historic load trace 1800.0 Image: state of transfer capability 1800.0 Historic load trace 1800.0 Image: state of transfer capability 1800.0 Historic load trace 1800.0 Image: state of transfer capability 1800.0 Historic load trace 1800.0 Image: state of transfer capability 1900.0 Image: stat
existing generation Emergency transfer capability Historic use of existing transfer capability Historic load trace $ \begin{array}{c} 1800.0 \\ $
Emergency transfer capability Historic use of existing transfer capability Historic load trace
capability Not applicable Historic use of existing transfer capability Not applicable Historic load trace
Historic use of existing transfer capability Historic load trace $u_{100.0}$
existing transfer capability Historic load trace
capability Historic load trace
Historic load trace
800.0 600.0 400.0
600.0 400.0
400.0
200.0
0.0 01-Jan-17 02-Mar-17 01-May-17 30-Jun-17 29-Aug-17 28-Oct-17 27-Dec-17
Month
Historic asset 80%
utilisation
Customer number No directly connected load (Generator connection station)
and type at location
Historic outage at No station black during last 5 years
location
Fault rating of 220kV – More than 23.1kA (3ph)
equipment 66kV – More than 8.5kA (3ph)
Reactive capability Not applicable
of equipment
Forecast load flow Switching station – load flow vary on the switching arrangement, generation dispatch etc.
Switching station is expected to handle switching between 500 -1600MVA.

Project Name	SMTS 500kV	SMTS 500kV GIS Replacement										
Location of	385, McDonal	385, McDonalds Road, South Morang.										
Constraint		, , , , , , , , , , , , , , , , , , ,										
Element	Switching stat	ion/ Coi	nnectio	n statio	n							
Constraint type	Load at risk											
Existing element	500/330kV - 1	000MV	'A									
rating	330/220kV - 1	200MV	'A									
	220/66kV – 45	220/66kV – 450MVA										
Load forecast	SMTS (MVA)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	
	Summer10	327.9	336.1	343.4	348.4	353.8	359.0	363.5	369.3	372.6	376.9	
	Summer50	299.4	305.9	311.8	315.6	319.9	324.7	328.3	333.1	336.4	340.4	
	Winter10	238.0	243.5	247.0	255.5	261.3	261.6	263.1	263.8	268.4	276.0	
	Winter50	232.0	236.7	240.7	249.8	255.2	255.0	256.8	257.9	261.4	269.6	
Maximum energy at	1,712MWh in											
risk	4,943MWh in	2026/27	7 (at 10	th perce	ntile de	emand f	orecast	:)				
Hours of load at												
risk												
Value of Customer	38,008 (\$/MW	h)										

Reliability used								
	7MWh in 2026/27 (at 50 th percentile demand forecast)							
Expected unserved	21MWh in 2026/27 (at 10 th percentile demand forecast)							
energy Cost of expected	\$0.28 million in 2026/27 (at 50 th percentile demand forecast)							
Cost of expected								
unserved energy	\$0.81 million in 2026/27 (at 10 th percentile demand forecast)							
Preferred network	Asset Replacement							
solution								
Proposed timing	2026							
Existing generation	150MW							
at the location								
Historic use of	80,800MWh in 2017							
existing generation								
Emergency transfer capability	33MVA for summer 2017/18							
Historic use of	Data not available							
existing transfer								
capability								
Historic load trace	300							
	250							
	0 01-Jan-17 02-Mar-17 01-May-17 30-Jun-17 29-Aug-17 28-Oct-17 27-Dec-17							
	Month							
Historic asset	59%							
utilisation								
Customer number	Number of Customers Consumption							
and type at location	Residential 101,342 43.57%							
	Commercial 6,671 43.07%							
	Industrial 688 10.38%							
	Agricultural 3,068 2.98%							
	Station peak demand –264.7MVA							
Historic outage at	No station black during last 5 years							
location								
Fault rating of	500kV – More than 20.2kA (3ph)							
equipment	330kV – More than 19.2kA (3ph)							
- 1	220kV – More than 21.6kA (3ph)							
	66kV – More than 21.3kA (3ph)							
Reactive capability	Two 186MVAR 330kV series cap banks (on DDTS 1 & 2 lines)							
of equipment								
Forecast load flow	Same as load forecast in the above table							
Project Name	DDTS H3 330/220kV Transformer and 330kV Circuit Breaker Replacement							
Location of	Yackandandah-Dederang Road, Dederang.							
Constraint								
Element	Switching station							
Constraint type	Load at risk							

oonstraint type	
Existing element	905MVA
rating	
Load forecast	No directly connected load (switching station)
Maximum load at	No directly connected load (switching station)

risk	
Hours of load at	No directly connected load (switching station)
risk	
Value of Customer	41,410 (\$/MWh)
Reliability used	
Expected unserved	No directly connected load (switching station)
energy	
Cost of unserved	No directly connected load (switching station)
energy	
Preferred network	Asset replacement
solution	
Proposed timing	2028
Existing generation	No directly connected generation
at the location	
Historic use of	Not applicable
existing generation	
Emergency transfer	No directly connected load (switching station)
capability	
Historic use of	Not applicable
existing transfer	
capability	700
Historic load trace	600 600 600 600 600 600 600 600
Historic asset utilisation	69%
Customer number	No directly connected load (switching station)
and type at location	
Historic outage at location	No station black during last 5 years
Fault rating of	330kV – More than 16.8kA (3ph)
equipment	220kV – More than 18.1kA (3ph)
Reactive capability	Two 225MVAR 330kV cap banks
of equipment	One 100MVAR 220kV cap bank
Forecast load flow	Switching station – load flow vary on the switching arrangement, generation dispatch etc.
	Switching station is expected to handle switching between 100 -600MVA.

Project Name	GTS 220 kV Ci	GTS 220 kV Circuit Breaker Replacement										
Location of	362, Anakie Ro	62, Anakie Road, Geelong.										
Constraint												
Element	Connection sta	Connection station										
Constraint type	Load at risk	Load at risk										
Existing element	600MVA	500MVA										
rating												
Load forecast	GTS 1-2 (MVA)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	
	Summer10	203.3	204.5	203.9	205.5	202.9	201.3	207.3	210.4	211.9	214.2	

	Summer50	182.2	183.9	184.0	184.1	186.4	185.6	188.9	193.2	193.7	197.3
	Winter10	169.6	170.6	172.2	176.5	178.4	182.0	184.8	184.2	188.6	187.8
	Winter50	163.2	163.9	165.6	170.6	172.3	175.2	178.3	178.0	181.4	181.1
	GTS 3-4 (MVA)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
	Summer10	317.5	316.5	312.9	312.8	306.7	302.1	308.1	310.1	309.7	310.6
	Summer50	270.4	270.2	267.8	265.4	266.2	262.6	264.6	268.1	266.4	268.7
	Winter10	207.5	206.9	206.9	209.7	209.7	211.9	213.0	209.9	212.9	216.5
	Winter50	198.4	196.9	197.5	201.2	201.1	202.4	203.9	201.3	203.2	207.3
Maximum energy at risk	None										
Hours of load at risk	Not applicable										
Value of Customer	42,205 (\$/MWh)									
Reliability used	, , , , ,	/									
Expected unserved	None										
energy											
Cost of expected	Not applicable										
unserved energy											
Preferred network	Asset Replacer	nent									
solution	2028										
Proposed timing	2028										
Existing generation at the location	25.7MW										
Historic use of	Data not availa	hlo									
existing generation	Data not available										
Emergency transfer	6.7MVA for summer 2017/18										
capability											
Historic use of	Data not available										
existing transfer											
capability											
Historic load trace	450										[
	400										
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	50										
	50	02-Mar-17	n	1-May-17	30-1	un-17	29-Aur-	17	28-Oct-17		7-Dec-17
	50	02-Mar-17	0	1-May-17		un-17 Ionth	29-Aug-	17	28-Oct-17	2	27-Dec-17
	50				Μ	lonth		17	28-Oct-17	2	?7-Dec-17
Historic asset	50 0 01-Jan-17				Μ	lonth		17	28-Oct-17	2	7-Dec-17
utilisation	Note: Sags after	er Septe	ember a	ire due	to B2 d	lonth	ors.		28-Oct-17	2	7-Dec-17
utilisation Customer number	50 01-Jan-17 Note: Sags afte	er Septe	ember a	of Cusi	to B2 d	lonth	ors. Consu	mption	28-Oct-17	2	7-Dec-17
utilisation	Note: Sags after 68%	er Septe	ember a lumber 1	of Cust 33,625	to B2 d	lonth	ors. Consu 31.9	mption 97%	28-Oct-17	2	7-Dec-17
Customer number	so o ol-Jan-17 Note: Sags afte 68% Residential Commercial	er Septe	ember a lumber 1	of Cust 33,625 9,725	to B2 d	lonth	ors. Consu 31.9 65.4	mption 97% 10%	28-Oct-17	2	7-Dec-17
utilisation Customer number	Note: Sags after 68% Residential Commercial Industrial	er Septe	ember a lumber 1	of Cust 33,625 9,725 1,426	to B2 d	lonth	Consu 31.9 65.4 2.1	mption 97% 40% 3%	28-Oct-17		77-Dec-17
utilisation Customer number	Note: Sags after 68% Residential Commercial Industrial Agricultural	r Septe	ember a lumber 1	of Cusi 33,625 9,725 1,426 994	to B2 d	lonth	ors. Consu 31.9 65.4	mption 97% 40% 3%	28-Oct-17		7-Dec-17
utilisation Customer number and type at location	Note: Sags after 68% Residential Commercial Industrial Agricultural Station peak de	er Septe	ember a lumber 1 - 406.5	of Cust 33,625 9,725 1,426 994 MVA	to B2 d	lonth	Consu 31.9 65.4 2.1	mption 97% 40% 3%	28-Oct-17	2	7-Dec-17
utilisation Customer number	Note: Sags after 68% Residential Commercial Industrial Agricultural	er Septe	ember a lumber 1 - 406.5	of Cust 33,625 9,725 1,426 994 MVA	to B2 d	lonth	Consu 31.9 65.4 2.1	mption 97% 40% 3%	28-Oct-17		7-Dec-17

equipment	66kV – More than 15.3kA (3ph)
Reactive capability	One 50MVAR 66kV cap bank
of equipment	One 25MVAR 66kV cap bank
Forecast load flow	Same as load forecast in the above table

Project Name	SMTS F2 Trar	nsforme	er and a	issociat	ed swit	chgear	Replac	ement				
Location of	385, McDonalds Road, South Morang.											
Constraint												
Element	Switching station/ Connection station											
Constraint type	Load at risk											
Existing element	500/330kV - 1	500/330kV – 1000MVA										
rating	330/220kV – 1	200MV	Ά									
	220/66kV – 45	50MVA										
Load forecast	SMTS (MVA)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	
	Summer10	327.9	336.1	343.4	348.4	353.8	359.0	363.5	369.3	372.6	376.9	
	Summer50	299.4	305.9	311.8	315.6	319.9	324.7	328.3	333.1	336.4	340.4	
	Winter10	238.0	243.5	247.0	255.5	261.3	261.6	263.1	263.8	268.4	276.0	
	Winter50	232.0	236.7	240.7	249.8	255.2	255.0	256.8	257.9	261.4	269.6	
Maximum energy at	1,712MWh in 2											
risk	4,943MWh in 2	2026/27	7 (at 10	th perce	ntile de	mand f	orecast	t)				
Hours of load at												
risk												
Value of Customer	38,008 (\$/MW	h)										
Reliability used							0					
Expected unserved	7MWh in 2026											
energy	21MWh in 202							0				
Cost of expected		\$0.28 million in 2026/27 (at 50 th percentile demand forecast)										
unserved energy		\$0.81 million in 2026/27 (at 10 th percentile demand forecast)										
Preferred network	Asset Replace	ement										
solution	2028											
Proposed timing Existing generation	150MW											
at the location	13010100											
Historic use of	80,800MWh ir	2017										
existing generation		12011										
Emergency transfer	33MVA for sur	nmer 2	017/18									
capability												
Historic use of	Data not availa	able										
existing transfer												
capability												
Historic load trace	300											
	250										_	
	200			Internal	1 Dill		1.0		1	h		
	¥ 150 —								A stated			
	100 -				ليرودوا بالمراد	ha balat d	4 JL 1					
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	01-Jan-17	02-Mar-17	C	1-May-17	30-Ju Mo	n-17 onth	29-Aug-17		28-Oct-17	27-0	0ec-17	
Historic asset	59%											
utilisation												
Customer number			Numbe	r of Cus	stomers	;	Cons	umptior	۱			
	<u>I - I-</u>											

and type at location	Residential	101,342	43.57%						
and type at location									
	Commercial	Commercial 6,671 43.07%							
	Industrial	Industrial 688 10.38%							
	Agricultural	Agricultural 3,068 2.98%							
	Station peak den	Station peak demand –264.7MVA							
Historic outage at	No station black	No station black during last 5 years							
location									
Fault rating of	500kV – More that	500kV – More than 20.2kA (3ph)							
equipment	330kV – More that	an 19.2kA (3ph)							
	220kV – More that	an 21.6kA (3ph)							
	66kV – More that	66kV – More than 21.3kA (3ph)							
Reactive capability	Two 186MVAR 3	Two 186MVAR 330kV series cap banks (on DDTS 1 & 2 lines)							
of equipment									
Forecast load flow	Same as load for	ecast in the above table							

Project Name	SYTS 500kV GIS Replacement
Location of	Victoria Road, Sydenham.
Constraint	
Element	Switching station
Constraint type	Switching constraints
Existing element	No transformers
rating	
Load forecast	No directly connected load (switching station)
Maximum load at	No directly connected load (switching station)
risk	
Hours of load at	No directly connected load (switching station)
risk	
Value of Customer	41,410 (\$/MWh)
Reliability used	
Expected unserved	No directly connected load (switching station)
energy	
Cost of unserved	No directly connected load (switching station)
energy	
Preferred network	Asset replacement
solution	
Proposed timing	2028
Existing generation	No directly connected generation
at the location	
Historic use of	Not applicable
existing generation	
Emergency transfer	No directly connected load (switching station)
capability	
Historic use of	Not applicable
existing transfer	
capability	

Historic load trace	2500 2000 1500 500 01-Jan-17 02-Mar-17 01-May-17 30-Jun-17 29-Aug-17 28-Oct-17 27-Dec-17 Month
Historic asset utilisation	33%
Customer number and type at location	No directly connected load (switching station)
Historic outage at location	No station black during last 5 years
Fault rating of equipment	500kV – More than 18.5kA (3ph)
Reactive capability of equipment	Not applicable
Forecast load flow	Switching station – load flow vary on the switching arrangement, generation dispatch etc. Switching station is expected to handle switching between 100 -1500MVA.

Project Name	SHTS B2 and B3 Transformer Replacement											
Location of	280, Verney Road, Shepparton.											
Constraint												
Element	Connection station											
Constraint type	Load at risk											
Existing element	450MVA											
rating												
Load forecast	SHTS (MVA)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	
	Summer10	296.7	298.0	294.5	294.9	288.5	283.6	291.3	294.2	294.3	296.0	
	Summer50	271.6	274.0	272.0	269.6	271.3	267.6	270.7	275.5	274.2	277.9	
	Winter10	202.7	205.6	207.2	212.2	213.9	217.7	220.3	218.3	222.7	225.2	
	Winter50	197.9	200.7	202.7	208.9	210.5	213.5	216.6	215.1	218.3	221.8	
Maximum energy at risk	None											
Hours of load at	Not applicable											
risk												
Value of Customer	40,104 MVA											
Reliability used												
Expected unserved	None											
energy												
Cost of expected	Not applicable											
unserved energy												
Preferred network	Asset Replacement											
solution												
Proposed timing	2027											
Existing generation at the location	13.45MW											
Historic use of	Data not available											
existing generation												
Emergency transfer	None											

capability								
Historic use of	Data not available							
existing transfer								
capability								
Historic load trace	300 250 200 150 50 0 01-Jan-17 02	Mar-17 01-May-17 30-Jun-17 Month	29-Aug-17 28-Oct-17	27-Dec-17				
Historic asset	60%							
utilisation	00,0							
Customer number		Number of Customers	Consumption					
and type at location	Residential	56,720	39.74%					
	Commercial	7,243	50.10%					
	Industrial	1,423	1.82%					
	Agricultural	5,798	8.33%					
	Station peak demand –270.8MW							
Historic outage at location	No station black during last 5 years							
Fault rating of	220kV – More than 6.9kA (3ph)							
equipment	66kV – More than 12.6kA (3ph)							
Reactive capability	Four 25MVAR 66kV cap banks							
of equipment								
Forecast load flow	Same as load for	ecast in the above table						

Notes:

- 1. Already committed and in-progress projects are not included in Table 2
- 2. Some assets like communication assets, protection assets etc. provide secondary services for primary assets to deliver their functions. These secondary assets cannot be replaced with standalone non-network solution. Therefore further details of these projects are not included in Table 2.
- 3. The transmission line asset replacement projects in Table 1 are only selected part replacements (condition based replacement of selected insulators, ground wire sections, conductor sections, tower members etc.) to maintain the transmission line to meet AusNet Services obligations (safety & reliability) and hence do not envisage any economically viable non-network solution to replace the services provided by the transmission line. Further details of these projects could be provided "as required" basis.