

TD-0014633 - SMTS 330/220 kV Transformer Replacement Business Case

Portfolio Business Line	Work Category	Work Code / Name
Transmission % Split: Trans: 100%	Replacement	2002 TCAPEX Station rebuilds
Project Start Date	Commissioning Readiness Date/AIS	Project Completion Date
13/09/2024	28/09/2028	21/12/2028
Business case purpose and overview		
This business case seeks approval to invest \$167.6 M (Including Direct Capital, OHs, CFCs and MR) CAPEX at South Morang Terminal Station (SMTS). The investment includes replacing two 700 MVA 330/220 kV transformers (H1 and H2 transformers) with their associated protection and control systems. The two transformers and secondary systems have been assessed to be in poor condition and present a risk of asset failure that will impact electricity users due to involuntary load curtailment resulting in expected unserved energy growing from 20.7 MWh in 2025 to 188.5 MWh by 2030. The project CAPEX will be distributed over the current (2022 to 2027) and next (2027 to 2032) regulatory control periods. It is expected that the AER will approve the forecast expenditure during the next TRR control period (2027 to 2032) as AusNet will be able to demonstrate that this is a committed project. An allowance of \$50.7 M has been included in the AER's final 2022 to 2027 TRR determination for this project. AEMO, in its role as the transmission network planner, has been consulted as part of the joint planning process and confirmed that there is an ongoing need for these transformers and that the new transformers should match the capability of the exiting H3 transformer. VicGrid and AEMO asked whether the project could be advanced (completion by 2029) to relief a network constraint. The regulatory investment test (RIT-T) for this project is well progressed and the Project Assessment Draft Report (PADR) has been published on 25 February 2025. No non-network options have been identified as feasible alternatives. The RIT-T will be concluded during Q2 this year. The forecasted project cost allows for cost increases in design, procurement, installation, etc. as per recent project delivery experiences of similar projects. The project scope and cost estimate has been reviewed by a multidisciplinary team and consideration has been given to clean-up cost for contaminated soil, site management and temporary storage of new transformers delivered to site. Planned network outages have been minimised as far as possible in developing the scope of work.		
Why is this project required? What's the value that this business case will deliver?		
SMTS is an important terminal station as it is part of the main transmission network backbone connecting major loads, generation and major interconnectors to other states such as the 330 kV interconnector to NSW. The H1 and H2 transformers will be more than 60 years old by the time they are replaced, and a risk analysis shows that it is no longer economical to continue to provide transmission network services with the existing two transformers as the asset failure risk has increased to a level where investment to replace the selected assets presents a more economical option. A transformer failure or simultaneous failure of more than one transformer will constrain generation and result in involuntary load curtailment impacting network users.		
Is this project part of the 5-year Reg Reset submission? Is this forecast in the current FY Plan? Incremental change in Opex	☒ Yes / ☐ No If Yes please select: ☐ EDPR / ☒ TRR / ☐ GAAR Reg Reset Category: Tx - Replacement Major Station Reset Amount: \$50.7 M (2022-2027 Regulatory control period, \$nominal)	
	Yes, but may need adjustments to accommodate the forecast first year of spend of \$5.2 M	
	No change is expected in Opex	

Project Expenditure Forecast (CY)

Project Expenditure for approval (nominal)	Calendar year (first 5 years)					Lifecycle Total
	2025	2026	2027	2028	2029	
Direct Capital expenditure	4.7	16.1	77.9	41.7	-	140.4
Overheads	0.4	1.2	5.8	3.1	-	10.5
Capitalised Finance Charges	0.1	0.6	2.0	4.3	-	7.0
Project Delivery Budget (SAP Capex budget)	5.2	17.9	85.8	49.1	-	157.9
Management Reserve	-	-	-	9.8	-	9.8
Total CAPEX for Approval (incl risk, CFCs & OHs)	5.2	17.9	85.8	58.8	-	167.6
Operating Expenditure for approval (Project Opex)	-	-	-	-	-	-
Written down value of assets retired/sold	0.0	-	-	-	-	0.0
Total Estimated expenditure for approval (nominal)	5.2	17.9	85.8	58.8	-	167.6

Analysis of investment options

Analysis of investment options (\$m - Present Value)	Capex	Opex	Total Financial Costs	Potential Costs	Other Economic Costs & (Benefits)	Total PV Cost	PV Cost Ratio (compared to BAU)	Financial outcome (in present value terms) - compared to BAU - excl non cash costs and benefits
BAU	-	-	-	-	1,272.0	1,272.0	1.00	
Option 1	143.0	-	143.0	-	49.6	192.5	0.15	Excluding Economic costs and benefits, this Option spends \$m more Capex compared to BAU ✓
Option 2	101.5	-	101.5	-	140.5	242.0	0.19	Excluding Economic costs and benefits, this Option spends \$m more Capex compared to BAU ✗

Options considered	- Base case (counter factual) - Option 1 (Recommended): Replace the H1 and H2 transformers with an in-service and a hot spare transformer bank - Option 2: Replace the H1 and H2 transformers with an in-service and a cold spare single-phase transformer		
	Option 1 has the highest net benefits of all options for most scenarios and sensitivity studies. It presents a robust investment decision to reduce the asset failure risk at SMTS.		
	Total value		Overview
	Avoided market impact cost of more than \$12.1 M pa from the first year of the investment		The project will not deliver a material reduction in business operating and maintenance cost.
Key benefit	- Availability of planned outages impacting project delivery - Human error incident that impacts the transmission system		
Key implementation/delivery risks			
Project Sponsor	Project Initiator & Dept		Date BC submitted
[C.I.C] GM Network Management Transmission	[C.I.C], Transmission Network Planning		27/02/2025

Business Case e-sign-off

Project # / Title / Version	TD14633 - SMTS 330/220 kV Transformer Replacement			
Name	Title	Signature	Date Approved	Comments
Delivery Review				
[C.I.C]	Project Manager/Group Leader	Via email	28/02/2025	
Endorsements				
[C.I.C]	GM Regulated Finance	Via RPF	17/03/2025	

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[C.I.C]	GM Group Engineering & Asset Management	Via RPF	17/03/2025	
[C.I.C]	GM Network Management (Transmission)	Via RPF	17/03/2025	
[C.I.C]	GM Project Delivery (Transmission)	Via RPF	17/03/2025	
DOA Approvals				
[C.I.C]	EGM Group Operations	Via RIC	20/03/2025	
[C.I.C]	EGM Transmission	Via RIC	20/03/2025	
[C.I.C]	Chief Financial Officer	Via RIC	20/03/2025	
Board	Board	 CR 02_25 - Circulating Resoluti	02/04/2025	

1. Project Background

SMTS is owned and operated by AusNet and is north of greater Melbourne. SMTS is one of the major terminal stations in Victoria which connects six other terminal stations and has four voltage levels – 500 kV, 330 kV, 220 kV and 66 kV. The 500 kV side connects three 500 kV lines from Hazelwood and Rowville terminal stations in the east and three 500 kV lines to Sydenham and Keilor terminal stations in the west. Two 1,000 MVA transformers steps the voltage down from 500 kV to 330 kV. There are three 700 MVA transformers (H1, H2 and H3) that steps the voltage down from 330 kV to 220 kV and two transformers that step the voltage down from 220 kV to 66 kV.

The H3 transformer was installed in 2018 to address the risk of a transformer failure given that AusNet did not have a suitable spare transformer at the time, and it was the first stage of a staged replacement of the 330/220 kV transformers.

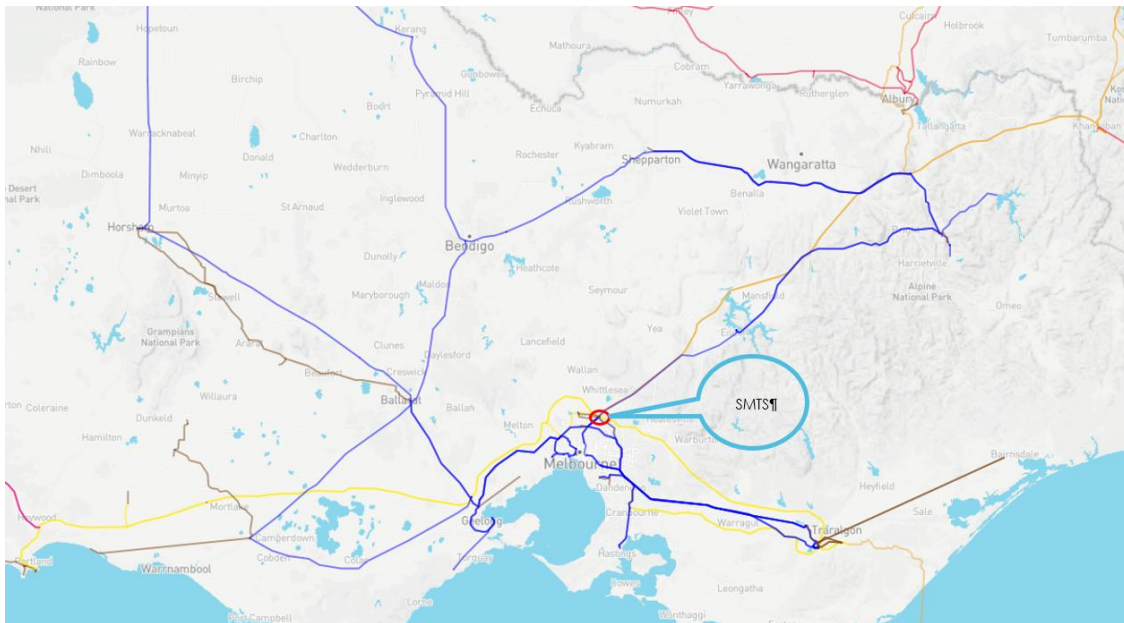


Figure 1: SMTS and the Victorian transmission network

1.1. Asset condition

The H1 and H2 transformers are in poor or very poor condition as expected of assets that have been in service since 1967/1968. No alternative maintenance strategies have been identified that would materially reduce the failure risk or address the lack of manufacturer support for these two transformers. Table 1 shows the failure rates applied in the project economic justification.

Circuit	Startup Year	2025	2026	2027	2028	2029	2030	2031
H1 TR B/PH	1967	0.088	0.090	0.092	0.094	0.095	0.097	0.099
H2 TR B/PH	1968	0.078	0.080	0.082	0.083	0.085	0.087	0.089
H3 TR B/PH	2018	0.009	0.010	0.010	0.011	0.012	0.012	0.013

Table 1: Forecast failure rates

The mean time to replace a transformer following a major failure has been assumed to be 24 months when no spare is available.

1.2. Identified need

The likelihood of a transformer failure is expected to increase over time due to the poor condition of the H1 and H2 330/220 kV transformers. Without remedial action, other than ongoing maintenance practice (business-as-usual), the assets are expected to deteriorate further and more rapidly. This will increase the market impact risk due to prolonged outages of the 330/220 kV transformers. In addition, there is also increased environmental and emergency replacement risks due to the poor condition of these assets.

Therefore, the 'identified need' this business case intends to address is to maintain reliable 330/220 kV transformation network services at SMTS and mitigate risks from asset failures.

The present value of the baseline risk costs has been calculated to be more than \$700 million over the forty-five-year period from 2025. The key elements of these risk costs are shown in Figure 2. The largest component of the baseline risk costs is the supply interruption risk, which is borne by electricity consumers.

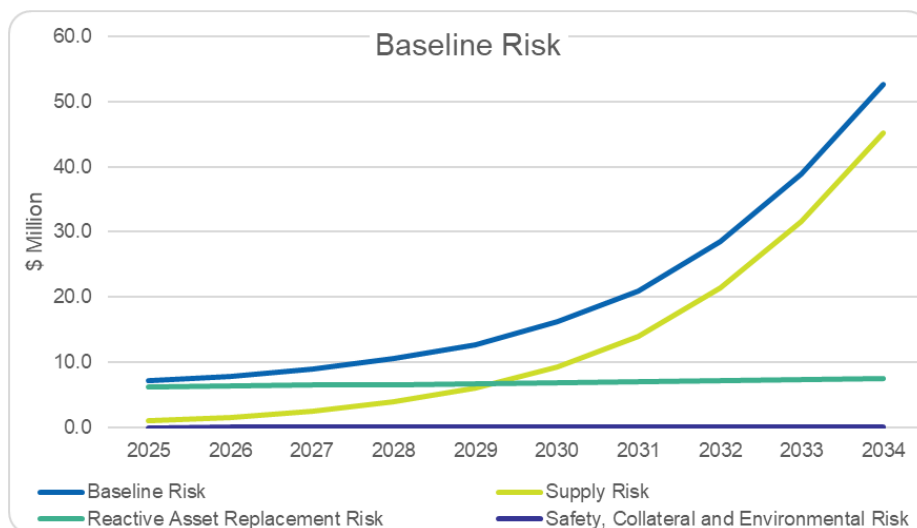


Figure 2: Baseline risk

1.3. Rationale for choosing Option 1

A risk analysis shows that it is no longer economical to continue to provide transmission network services with the existing transformers as the asset failure risk has increased to a level where investment to replace the selected assets presents a more economical option. A transformer failure or simultaneous failure of more than one transformer will constrain generation and result in involuntary load curtailment impacting network users.

Option 1 has the highest net benefits for a range of sensitivity studies where input variables are varied one at a time. It allows for a quicker recovery from a transformer failure as it provides for a hot spare transformer bank that can be remotely switched into service.

Option 2 requires replacing the failed transformer phase with the cold spare phase and it is expected that this will take longer than a month to be completed.

Figure 3 shows that the project benefits outweigh the investment cost for both options for all the sensitivities and that Option 1 presents a better economic solution for most of the sensitivity studies.

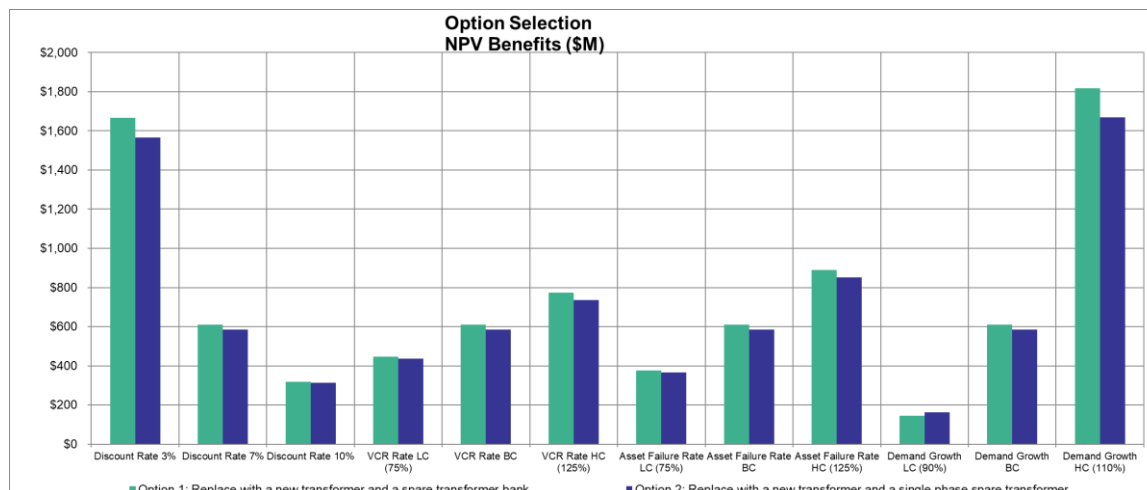


Figure 3: Option selection – NPV benefits

1.4. Rationale for why Option 2 was not chosen

Option 2 only includes a cold spare transformer phase. A major transformer failure at SMTS 330/220 kV will require removing the failed transformer phase and using the spare phase to restore supply. This could take about one month and this option hence has higher residual risk compared with Option 1.

2. Project Scope

2.1. In Scope

Item No	In Scope
IS-1	Procure two new 700 MVA 330/220 kV transformers matching the H3 transformer to replace the existing H1 and H2 transformers. One transformer will be an in-service unit and the other a hot spare.
IS-2	New protection and control systems.

2.2. Dependencies

Item No	Project Dependency Details and Description
D-1	TD-0008025 is a project to replace the F2 transformer and 500 kV GIS. This project is not expected to have an impact and has been considered when the scope and cost for TD14633 has been prepared.
D-2	The third 220/66 kV SMTS transformer project may overlap with the asset replacement project and 220kV bus outages could be coordinated if possible. It is not considered to present any challenges and has been considered when scoping and estimating TD14633.

3. Key Benefit and Assumptions

Incentives and Customer: These are projects which are justified using external incentive schemes such as STPIS, F-Factor, CSIS, DMIS, etc

- Example: Improvements to reliability. A program of replacing fuses to prevent candling fuses and improve F-factor performance

Efficiency: These are projects where the expenditure will result in efficiency gains

- Example: Replacing a transformer to avoid additional maintenance costs incurred in the future

Safety Risk and Compliance: These are projects aimed at managing safety risk or compliance issues

- Example: ESV Commitments, environment and safety

Savings to existing cost base: These are reductions to the existing cost base (**not avoided costs**)

- Example: Relocating an overhead feeder section with high vegetation maintenance costs to reduce current vegetation opex

Option	Benefit Detail	Key Benefit Category	Key Benefit Value (\$)	Key Benefit Assumptions (Baseline and Measurement)	Benefit Start to Full Realisation Date
Option 1	Is there a direct bottom line budget impact? ☐ Yes / ☒ No Cost Centre: CPX: OPX (per annum): \$0	Incentives & Customer	\$12.1 M in the first year	Reduction in involuntary load curtailment, safety, environmental and plant collateral damage risk. The baseline risk in the first year after implementing the option (2029) is valued at \$12.7M with \$5.9M of this coming from the cost of involuntary load curtailment (120.7 MWh of expected unserved energy quantified using a Value of Customer Reliability (VCR) of \$49.23k/MWh). Post implementation of the option, the value of the total risk is reduced to \$0.6M.	Benefit start: 05/08/2027 Full Realisation: 28/09/2028
Option 2	Is there a direct bottom line budget impact? ☐ Yes / ☒ No Cost Centre: CPX: OPX (per annum): \$0	Incentives & Customer	\$11.8 M in the first year	Reduction in involuntary load curtailment, safety, environmental and plant collateral damage risk. The baseline risk in the first year after implementing the option (2029) is valued at \$12.7M with \$5.9M of this coming from the cost of involuntary load curtailment (188.5 MWh of expected unserved energy quantified using a Value of Customer Reliability (VCR) of \$49.23k/MWh). Post implementation, the value of the total risk is reduced to \$0.9M.	Benefit start: 05/08/2027 Full Realisation: 28/09/2028

4. Financials

4.1. Opex Breakdown

Opex excl Project implementation (nominal)	Calendar year (first 5 years)					Lifecycle Total
	2025	2026	2027	2028	2029	
BAU Total Opex	-	-	-	-	-	-
Incremental Opex Costs - Option 1	-	-	-	-	-	-
Opex Savings - Option 1	-	-	-	-	-	-
Net Budget impact (split by division below)	-	-	-	-	-	-
New Cost profile	-	-	-	-	-	-

4.2. Capex Breakdown

Capex Breakdown (incl mngt reserve - nominal)	Calendar year (first 5 years)					Lifecycle Total
	2025	2026	2027	2028	2029	
Design	1.6	1.1	-	-	-	2.7
Internal Labour	0.5	1.8	2.7	2.7	-	7.7
Materials	2.6	8.2	47.0	17.2	-	75.0
Plant & Equipment	-	0.0	0.0	0.0	-	0.1
Contracts	-	5.0	28.2	21.7	-	54.9
Meter Costs	-	-	-	-	-	-
Other	-	-	-	-	-	-
Management Reserve (incl Risk)	-	-	-	9.8	-	9.8
Total Capex	4.7	16.1	77.9	51.4	-	150.1

5. Schedule

Key Milestone and Deliverables (Waterfall)	Planned Completion Date
Approval of Stage Gate 2	9/09/2024
Approval of Business Case	25/03/2025
Approval of RIT ☐ N/A	30/04/2025
Transformer Procurement Commencement	10/04/2025
Detailed Design and Planning Commencement	31/07/2025
Construction Commencement	10/06/2026
Commissioning Readiness Complete	28/09/2028
Project Completion - Stage Gate 6 Approval	21/12/2028

6. Risk Identification

A preliminary risk assessment has been completed, with more detailed review and planning to follow as the delivery plan is developed. This will include application of Utility Risk Management principles to identify all critical safety hazards and validate that effective barriers are in place.

A preliminary risk assessment identified that planned outage cancellation and supply chain constraints have the highest residual risk ratings and are common causes of project delays and cost over-runs. Environmental risks (oil leaks) and safety risks (lifting, electrical hazards) remain significant but manageable. Design related risks are moderate to high and stakeholder and regulatory risks are lower but still important.

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AusNet has deep experience undertaking similar projects and the delivery team is confident that with proper planning, project management and safety controls the risks can be managed within AusNet's risk appetite and the budget requested, noting management reserve of \$9.8m.

Project Risk	What could occur?	Consequence Rating 1-5	Likelihood Rating (Almost Certain - Rare)	Current Risk Rating A-E	Actions and controls in place to manage/ reduce risk	Target Risk Level A-E
Availability of planned outages impacting project delivery	Project delays	1	Unlikely	E	Planned outages have been minimised as far as possible for the planned scope.	E
Human error incident that impacts the transmission system	Customers impacted because of involuntary load shedding	2	Unlikely	D	Project reviews and detailed scope preparation to minimise risks for all project stages. Training, etc.	E

Refer to [Risk Assessment Criteria Summary](#)

7. Sustainability

List the changes to sustainability this project will deliver in the table below.

Sustainability Consideration	Impact from this project	Comments
Greenhouse gas emissions ☒ N/A	☐ Increase ☐ Neutral ☐ Decrease	NA
Waste ☒ N/A	☐ Waste reduction strategies to be implemented	NA
Social procurement ☒ N/A	☐ Purchases from social enterprises ¹ ☐ Purchases from Aboriginal and Torres Strait Islander-owned businesses ² ☐ Purchases from Australian Disability Enterprises ³	NA

¹ See The Loop for access to potential supplier lists from [social enterprises](#) on the "Suppliers" tab [How to purchase \(sharepoint.com\)](#).

² See The Loop for access to potential supplier lists from [Aboriginal and Torres Strait Islander businesses](#) on the "Suppliers" tab [How to purchase \(sharepoint.com\)](#).

³ Australian Disability Enterprises [ADE](#)

	☐ Purchases from local suppliers ⁴	
Community ☐ N/A	☒ Community consultation required ☐ Community benefits actions	Several projects will be undertaken at SMTS concurrently and it thus warrants community consultation on traffic, noise and dust controls

8. Corporate Accounting Considerations

Capex profit centre	13260
Propex profit centre	N/A
Opex (BAU) owner & cost centre	[C.I.C], 13945
Transmission Regulatory Key	Prescribed Shared (PS)

Note: OPEX owner assumes responsibility for any write off costs should the project be cancelled.

8.1. Asset Retirements

The total asset write-down amount is \$12 K. It includes an isolator and fall arrest systems as per the fixed assets report attached. These assets are not suitable for spares.

Finance introduced a service life review process to allow for changes to be made to an asset's financial life and to apply accelerated depreciation over a shorter timeframe once it has been confirmed that an asset is not going to reach its expected life. This may be due to planned replacements, technology improvements, or site / industry decisions such as site closures. Assets adjusted this way will depreciate to zero by the project end date, resulting in a favourable financial outcome compared with not making the adjustment.

8.2. Contributed (Gifted) Assets

N/A

8.3. Assets to be created

Description of Asset	Quantity	Estimated Cost (total)	Expected Asset Life
700 MVA 330/220 kV Transformer	2	\$157.9 M	45 years
Totals	2	\$157.9 M	

Note: Total Estimated Cost must match the Delivery Budget (+CFC & O/H) on page 1.

⁴ Local suppliers, as defined by the State government for the purchase. See [Local Jobs First - Glossary](#) for Victorian Government definition of "local"

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This project will replace the existing assets in a like-for-like manner with details provided in the attached scope of work document.

9. Checklist

For transmission network projects, is there a market impact in the delivery of the project?	☐ N/A / ☐ Yes / ☒ No <<If yes, add the STPIS costs of delivering the project. If unsure, contact <vnsplanner@ausnetservices.com.au>>
	The STPIS cost to deliver the project is estimated at \$0 M.
	☐ N/A / ☐ Yes / ☒ No << If yes, what are the savings? \$X >>
Has a Value Engineering Workshop been conducted?	☐ N/A / ☐ Yes / ☒ No << If yes, what are the savings? \$X >>
For the purposes of RIT, have you considered all credible options including non-network options?	☐ N/A / ☒ Yes / ☐ No

10. Appendix A - Attachments

Attach files as objects. Asterisks (*) are mandatory documents.

Document Title	Attachment (Embedded document)
Scope of Works / Initiative Brief *	 TD-0014633%20SMTS%20H%20Transf%20
Financial Model with NPV*	 SMTS H Transformer NPV Model.xlsm
Detailed Cost Estimate and Benefit Assumptions*	 SMTS_Htransformer_Economic_Model.xlsm
Write Down Value (WDV) details	 TD-0014633%20WDV .xlsx
Gifted Assets details	N/A