

Investment Evaluation Summary (IES)



Project Details:

Project Name:	Replace Bellerive 33 kV Oil Filled Sub-transmission Cable
Project ID:	00701
Thread:	Underground System
CAPEX/OPEX:	CAPEX
Service Classification:	Standard Control
Scope Type:	A
Work Category Code:	REUGC
Work Category Description:	Replace cables UG - HV
Preferred Option Description:	<p>Option 1: Replace 33 kV oil-filled cables with new XLPE cables</p> <p>Replace the oil-filled sub-transmission cables with XLPE cable when installing new transformers at the Bellerive Zone substation.</p> <p>Advantages</p> <ul style="list-style-type: none"> • Maintain security of supply • XLPE cable requires no maintenance • No chance of oil related environmental incident • Allows transformers to be operated at their rated capacity <p>Disadvantages</p> <ul style="list-style-type: none"> • CAPEX required • Higher number of resources to be used
Preferred Option Estimate (Nominal Dollars):	\$992,552

	25/26
Unit (\$)	N/A
Volume	2
Estimate (\$)	
Total (\$)	\$992,553

Governance:

Project Initiator:	Jarad Hughes	Date:	27/03/2015
Thread Approved:	David Ellis	Date:	02/11/2015
Project Approver:	David Ellis	Date:	02/11/2015

Document Details:

Version Number:	1
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Related Documents:

Description	URL
NPV	http://projectzone.tnad.tasnetworks.com.au/business-projects/nis-program/DD17SAM/Deliverables/Underground%20Systems/Bellerive%20subtransmission%20cable%20replacement%20NPV.xlsm
Replace Bellerive 33 kV Oil Filled Sub-transmission Cable - IES	http://projectzone.tnad.tasnetworks.com.au/business-projects/nis-program/DD17SAM/Deliverables/Underground%20Systems/DRAFT%20IES%20REUGC%20Replace%20Bellerive%2033%20KV%20Oil%20Filled%20Sub-transmission%20Cable.docx

Section 1 (Gated Investment Step 1)

1. Background

Sub transmission cables 25305 and 25310 supplies the Bellerive Zone substation. They are oil filled 33kV cables and were installed in 1970 to supply the Bellerive Zone substation. The substation is a 33/11kV substation of 45MVA capacity in the eastern suburbs of Hobart. The substation was commissioned in 1970.

The substation supplies 4406 residential and commercial customers in the areas of Bellerive, Howrah, Mornington, Warrane, and Rosny Park. The substation is also strategic in providing alternative supply to other surrounding areas e.g. Lindisfarne, Rosebay, Geilston Bay and Clarendon vale in the event of need to supplement Howrah or Geilston Bay substations.

1.1 Investment Need

The oil-filled cable sections of the 33 kV sub-transmission feeders pose a constraint for the Bellerive Zone Substation and do not allow the full capacity of the transformers to be utilised.

The replacement of the existing power transformers in the zone substation is scheduled to occur in the 2025/2026 financial year. The design of standard power transformers does not allow for the direct connection of the existing oil filled cables. Connection of the cable would require an intermediary cable to be installed between the existing cables and new transformer. The cost to undertake this on both transformers is estimated at \$350-500k.

The replacement of the existing oil file sub-transmission cables at the time of the transformer replacement would eliminate the cost of reconnecting the exiting cables and so is a more cost effective approach to eliminate the existing constraint and eliminate the need for future investment when the existing cables would have reached the end of their service life.

In addition there will be reduced maintenance following the completion of this work as new XLPE cables do not require routine maintenance.

1.2 Customer Needs or Impact

TasNetworks continues to undertake a consumer engagement as part of business as usual and through the voice of the customer program. This engagement seeks in depth feedback on specific issues relating to:

- how it prices impact on its services
- current and future consumer energy use
- outage experiences (frequency and duration) and expectations
- communication expectations
- STPIS expectations (reliability standards and incentive payments)
- increase understanding of the electricity industry and TasNetworks

Consumers have identified safety, restoration of faults/emergencies and supply reliability as the highest performing services offered by TasNetworks.

Consumers also identified that into the future they believe that affordability, green, communicative, innovative, efficient and reliable services must be provided by TasNetworks.

This project specifically addresses the requirements of consumers in the areas of;

- safety, restoration of faults/emergencies and supply reliability

1.3 Regulatory Considerations

This project is required to achieve the following capital and operational expenditure objectives as described by the National Electricity Rules section 6.5.7(a).

6.5.7 (a) Forecast capital expenditure

- (1) meet or manage the expected demand for standard control services over that period;
- (3) to the extent that there is no applicable regulatory obligation or requirement in relation to:
 - (i) the quality, reliability or security of supply of standard control services; or
 - (ii) the reliability or security of the distribution system through the supply of standard control services, to the relevant extent:
 - (iii) maintain the quality, reliability and security of supply of standard control services; and
 - (iv) maintain the reliability and security of the distribution system through the supply of standard control services.

2. Project Objectives

The objective of this project solution is to replace the two 33 kV oil-filled sub-transmission cables that supply Bellerive Zone Substation with new XLPE cables. This work will help maintain the existing reliability and prevent an environmental incident from one of the oil-filled cables

3. Strategic Alignment

3.1 Business Objectives

Strategic and operational performance objectives relevant to this project are derived from TasNetworks 2014 Corporate Plan, approved by the board in 2014. This project is relevant to the following areas of the corporate plan:

- We care for our assets, delivering safe and reliable networks services while transforming our business.

3.2 Business Initiatives

The business initiatives that relate to this project are as follows:

- We care for our assets to ensure they deliver safe and reliable network services

The strategic key performance indicators that will be impacted through undertaking this project are as follows:

- Network service performance – meet network planning standards
- Network service performance – outcomes under service target performance incentive schemes

4. Current Risk Evaluation

If TasNetworks does nothing when the new transformers are installed at the Bellerive Zone substation, then the existing oil-filled cables will be joined to the XLPE cable that will terminate in the new Bellerive Zone substation transformers. The oil-filled cable poses supply security and oil leakage risks currently.

4.1 5x5 Risk Matrix

TasNetworks business risks are analysed utilising the 5x5 corporate risk matrix, as outlined in TasNetworks Risk Management Framework.

Relevant strategic business risk factors that apply are follows:

Risk Category	Risk	Likelihood	Consequence	Risk Rating
Environment and Community	Significant environmental impact with large remediation work required as a result of an oil-filled cable leak.	Unlikely	Moderate	Medium
Network Performance	Interruption to supply across multiple areas or substantial quality of supply issues with possible short term load shedding as a result of failure of a sub-transmission cable.	Unlikely	Moderate	Medium

Section 1 Approvals (Gated Investment Step 1)

Project Initiator:	Jarad Hughes	Date:	27/03/2015
Line Manager:		Date:	
Manager (Network Projects) or Group/Business Manager (Non-network projects):		Date:	
[Send this signed and endorsed summary to the Capital Works Program Coordinator.]			

Actions			
CWP Project Manager commenced initiation:		Assigned CW Project Manager:	
PI notified project initiation commenced:		Actioned by:	

Section 2 (Gated Investment Step 2)

5. Preferred Option:

The preferred solution is to replace the two 33 kV oil-filled sub-transmission cables that supply Bellerive Zone Substation with new XLPE cables.

5.1 Scope

This work will include replacement of the two 33 kV oil-filled cables that supply Bellerive Zone substation with new XLPE cables. There are two options for replacement of these cables:

- Replace cables on the same route and connect to existing overhead sections (leaving Bellerive connected to Lindisfarne Terminal Substation)
- Install two new XLPE cables from Mornington Terminal Substation along the transmission line easement and under the South Arm Highway to Bellerive

Cables are to be sized such that the capacity of these assets are, at a minimum, equivalent to the 1 hr emergency rating of the new transformers. Recommended cable sizes are 400 sqmm Al for direct buried sections and 300 sqmm Cu for ducts

5.2 Expected outcomes and benefits

It is expected that with the implementation of this project current level of reliability and system security will be maintained.

Replacement at the time of the zone substation transformer replacement is the most cost effective time to undertake the work.

The removal of the oil filled cables would also result in a reduction in the maintenance requirements.

5.3 Regulatory Test

Not applicable.

6. Options Analysis

6.1 Option Summary

Option description	
Option 0	<p>Option 0: Do Nothing</p> <p>Do Nothing (do not replace cables when installing new Bellerive transformers) - joint new XLPE cables onto the existing 33 kV oil-filled cables for termination into the new transformer cable boxes.</p> <p>Advantages</p> <ul style="list-style-type: none">• Lowest initial cost, but future cable replacement still necessary• Less use of resources

	<p>Disadvantages</p> <ul style="list-style-type: none"> • Oil-filled cable may create environmental incident • Security of supply from substation greatly compromised • Potential for significant loss of customer supply • Significant capital investment to reconnect exiting cables
Option 1 (preferred)	<p>Option 1: Replace 33 kV oil-filled cables with new XLPE cables</p> <p>Replace the oil-filled sub-transmission cables with XLPE cable when installing new transformers at the Bellerive Zone substation.</p> <p>Advantages</p> <ul style="list-style-type: none"> • Maintain security of supply • XLPE cable requires no maintenance • No chance of oil related environmental incident • Allows transformers to be operated at their rated capacity <p>Disadvantages</p> <ul style="list-style-type: none"> • CAPEX required • Higher number of resources to be used

6.2 Summary of Drivers

Option	
Option 0	This option does not adequately address the environmental and reliability risks associated with these cables. Maintenance is also required to be completed on the oil-filled assets and following a failure or fault on these cables there is no one in Tasmania with the expertise to undertake the repair work. This may result in lengthy outages, short term load shedding or continued power quality issues.
Option 1 (preferred)	This option addresses the environmental and reliability risks associated with aged and poor condition oil-filled cables

6.3 Summary of Costs

Option	Total Cost (\$)
Option 0	\$340,000
Option 1 (preferred)	\$992,552

6.4 Summary of Risk

Option 0: Do Nothing

The environmental risk likelihood will increase as the condition of the cables worsens. The performance of the network will decrease as the condition of cables worsens.

Option 1: Replace 33 kV oil-filled cables with new XLPE cables

The environmental risk will be eliminated with the removal of the oil-filled cables and the network performance will be maintained at its current level.

6.5 Economic analysis

Option	Description	NPV
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Option 0	<p>Option 0: Do Nothing</p> <p>Do Nothing (do not replace cables when installing new Bellerive transformers) - joint new XLPE cables onto the existing 33 kV oil-filled cables for termination into the new transformer cable boxes.</p> <p>Advantages</p> <ul style="list-style-type: none"> • Lowest initial cost, but future cable replacement still necessary • Less use of resources <p>Disadvantages</p> <ul style="list-style-type: none"> • Oil-filled cable may create environmental incident • Security of supply from substation greatly compromised • Potential for significant loss of customer supply • Significant capital investment to reconnect exiting cables 	-\$388,371
Option 1 (preferred)	<p>Option 1: Replace 33 kV oil-filled cables with new XLPE cables</p> <p>Replace the oil-filled sub-transmission cables with XLPE cable when installing new transformers at the Bellerive Zone substation.</p> <p>Advantages</p> <ul style="list-style-type: none"> • Maintain security of supply • XLPE cable requires no maintenance • No chance of oil related environmental incident • Allows transformers to be operated at their rated capacity <p>Disadvantages</p> <ul style="list-style-type: none"> • CAPEX required • Higher number of resources to be used 	-\$254,046

6.5.1 Quantitative Risk Analysis

Not applicable.

6.5.2 Benchmarking

Not applicable.

6.5.3 Expert findings

Not applicable.

6.5.4 Assumptions

It is assumed that the replacement of the Bellerive Zone Substation 33/11 kV transformers will occur.

Section 2 Approvals (Gated Investment Step 2)

Project Initiator:	Jarad Hughes	Date:	27/03/2015
Project Manager:		Date:	

Actions			
Submitted for CIRT review:		Actioned by:	
CIRT outcome:			