Investment Evaluation Summary (IES)

Project Details:

Project Name:	Install Remote Fault Indicators in Ground Mounted Substations
Project ID:	00390
Thread:	Protection and Control
CAPEX/OPEX:	CAPEX
Service Classification:	Standard Control
Scope Type:	A
Work Category Code:	PRUGA
Work Category Description:	Install HV Fdr Control, DA & Comms - Underground
Preferred Option Description:	Option 2: Install remote fault indicators in 40% of the ground-mounted fault indication fleet (preferred). Advantages: Option 1 but with 40% SCADA communications – advantages are lessened, lowest sustainable cost. Disadvantages: customer disturbance durations more likely than Option 1, less visibility of the fleet.
Preferred Option Estimate (Nominal Dollars):	$563,650

	17/18	**18/19**	**19/20**	**20/21**	**21/22**	**22/23**	**23/24**	**24/25**	**25/26**	**26/27**
Unit ($)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Volume	13	13	13	13	13	13	13	13	13	13
Estimate ($)										
Total ($)	$56,365	$56,365	$56,365	$56,365	$56,365	$56,365	$56,365	$56,365	$56,365	$56,365

Governance:

Project Initiator:	Tim Sutton	**Date:**	11/03/2015
Thread Approved:	David Ellis	**Date:**	02/11/2015
Project Approver:	David Ellis	**Date:**	02/11/2015

Document Details:

Version Number:	1

Related Documents:

Description	URL
IES	http://projectzone.tnad.tasnetworks.com.au/business-projects/nis-program/DD17SAM/Deliverables/Protection%20and%20Control/PRUGA%20Install%20Remote%20Fault%20Indicators%20in%20Ground-Mounted%20Substations.docx
NPV	http://projectzone.tnad.tasnetworks.com.au/business-projects/nis-program/DD17SAM/Deliverables/Protection%20and%20Control/NPV%20PRUGA.xlsm

Section 1 (Gated Investment Step 1)

1. Background

TasNetworks' (TN) has a fleet of approximately 2,200 ground-mounted (GM) substations in its underground network. Of these sites it is estimated that 22% have existing fault indication capability, in the form of local visual indication, by way of clamped CT devices. After a fault has occurred these devices activate a visual flag enabling operators on patrol to determine if the substation was on the fault path. Post-fault, all the devices on the fault path are required to be manually reset, a task which adds to fault restoration OPEX. In some cases (due to time restrictions) devices are not reset, rendering them useless for the next fault operation and delaying the restoration time considerably.

These fault indication devices are approaching their end of life (according to a sample, with an average age of 37.59 years). During the forthcoming regulatory period these devices will require refurbishment.

Under distribution contingency scenarios Network Operations would benefit greatly by having remote visibility of GM substation loading conditions in real time to ensure that contingencies are handled correctly. Furthermore, models suggest that significant OPEX savings could be realised by having remote motoring of GM substations, to obviate the need for regular maintenance.

This can be achieved by replacing the existing fault indication devices with SCADA communications-enabled remote fault indicators, along with associated communications hardware such as a modem, power supply, aerial, and cabling to facilitate SCADA communications with the Master Station.

1.1 Investment Need

Funding is requested to provide SCADA communications ready remote fault indicators to a portion of TN's GM fault indication fleet for the following reasons:

- Provides situational awareness under a range of contingency scenarios.
- Provides unsolicited messaging in real time in the case of a fault.
- Improves data capability – loading and power quality information at remote feeder ends, as well as live asset condition data (invaluable when assets reach their end-of-life).
- Reduces OPEX funding associated with load checks in the field.
- Reduces OPEX associated with field operations under contingencies, reducing customer disturbances.

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); and
- 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). (4) maintain the safety of the distribution system through the supply of standard control services.

2. Project Objectives

To undertake specified CAPEX-based replacement of GM substation fault indicators with SCADA enabled alternative devices.

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 understand our customers by making them central to all we do.
- We enable our people to deliver value.
- 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:

- Safety of our people and the community, while reliably providing network services, is fundamental to the TasNetworks business and remains our immediate priority
- 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:

- Price for customers – lowest sustainable prices
- Zero harm – significant and reportable incidents
- Sustainable cost reduction – efficient operating and capital expenditure

4. Current Risk Evaluation

Do nothing is not an acceptable option to TN's risk appetite. The level of risk identified is such that a treatment plan is required to reduce the risks to a tolerable level, in line with TasNetworks' Risk Management Framework.

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
Customer	Outage effects on customer	Possible	Major	High
Environment and Community	Environmental damage	Unlikely	Major	Medium
Financial	Penalties resulting from reliability events	Possible	Minor	Low
Network Performance	Damage to plant and equipment	Unlikely	Minor	Low
Regulatory Compliance	Penalties resulting from reliability events in the high/low density areas	Possible	Minor	Low
Reputation	Outage effects on customer	Unlikely	Moderate	Medium
Safety and People	Damage to personnel and/or the general public	Unlikely	Moderate	Medium

Section 1 Approvals (Gated Investment Step 1)

Project Initiator:	Tim Sutton	**Date:**	11/03/2015
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 option is to install remote fault indicators in 40% of the ground-mounted fault indication fleet.

5.1 Scope

Replace 19 fault indicators per year with remote (SCADA-ready) fault indicators. Introduce associated SCADA communications hardware to the above sites.

5.2 Expected outcomes and benefits

Funding is requested to provide SCADA communications ready remote fault indicators to a portion of TN's GM fault indication fleet for the following reasons:

- Provides situational awareness under a range of contingency scenarios.
- Provides unsolicited messaging in real time in the case of a fault.
- Improves data capability – loading and power quality information at remote feeder ends, as well as live asset condition data (invaluable when assets reach their end-of-life).
- Reduces OPEX funding associated with load checks in the field.
- Reduces OPEX associated with field operations under contingencies, reducing customer disturbances.

5.3 Regulatory Test

Not applicable.

6. Options Analysis

6.1 Option Summary

Option description	
Option 0	Option 0: Do nothing – continue with existing aged fleet of GM fault indication. Advantages: no new secondary equipment to introduce to the distribution network. Disadvantages: due to age and condition these devices would no longer be able to be relied upon as a fault response tool, lack of visibility under contingency scenarios, lack of asset condition data for this asset class.
Option 1	Option 1: Install remote fault indicators in 60% of the ground-mounted fault indication fleet. Advantages: provides situational awareness under a range of contingency scenarios, provides unsolicited messaging in real time, improves data capability – loading and power quality information at remote feeder ends, as

	well as live asset condition data (valuable when assets reach their end-of-life), reduces OPEX associated with load checks in the field, reduces OPEX associated with field operations under contingencies, reducing customer disturbances. Disadvantages: additional capital cost in comparison with Option 2.
Option 2 (preferred)	Option 2: Install remote fault indicators in 40% of the ground-mounted fault indication fleet (preferred). Advantages: Option 1 but with 40% SCADA communications – advantages are lessened, lowest sustainable cost. Disadvantages: customer disturbance durations more likely than Option 1, less visibility of the fleet.

6.2 Summary of Drivers

Option	
Option 0	OPEX reduction - does not address. Minimise customer disruption - does not address. Improves asset management capability - does not address. Minimise customer cost - addresses.
Option 1	OPEX reduction - addresses. Minimise customer disruption - addresses. Improves asset management capability - addresses. Minimise customer cost - does not address.
Option 2 (preferred)	OPEX reduction - partially addresses. Minimise customer disruption - partially addresses. Improves asset management capability - partially addresses. Minimise customer cost - addresses.

6.3 Summary of Costs

Option	**Total Cost ($)**
Option 0	$0
Option 1	$1,233,090
Option 2 (preferred)	$563,650

6.4 Summary of Risk

This section outlines an overall *residual* asset risk level, for each of the options.

Option	Risk Assessment
Option 0	Medium
Option 1	Low
Option 2 (preferred)	Low

6.5 Economic analysis

Option	Description	NPV
Option 0	Option 0: Do nothing – continue with existing aged fleet of GM fault indication. Advantages: no new secondary equipment to introduce to the distribution network. Disadvantages: due to age and condition these devices would no longer be able to be relied upon as a fault response tool, lack of visibility under contingency scenarios, lack of asset condition data for this asset class.	$0
Option 1	Option 1: Install remote fault indicators in 60% of the ground-mounted fault indication fleet. Advantages: provides situational awareness under a range of contingency scenarios, provides unsolicited messaging in real time, improves data capability – loading and power quality information at remote feeder ends, as well as live asset condition data (valuable when assets reach their end-of-life), reduces OPEX associated with load checks in the field, reduces OPEX associated with field operations under contingencies, reducing customer disturbances. Disadvantages: additional capital cost in comparison with Option 2.	-$699,670
Option 2 (preferred)	Option 2: Install remote fault indicators in 40% of the ground-mounted fault indication fleet (preferred). Advantages: Option 1 but with 40% SCADA communications – advantages are lessened, lowest sustainable cost. Disadvantages: customer disturbance durations more likely than Option 1, less visibility of the fleet.	-$319,822

6.5.1 Quantitative Risk Analysis

Not applicable.

6.5.2 Benchmarking

Similar strategies have been adopted by mainland utilities for their regulatory submissions.

6.5.3 Expert findings

Not applicable.

6.5.4 Assumptions

All costs are in 2014/15 dollars.

Section 2 Approvals (Gated Investment Step 2)

Project Initiator:	Tim Sutton	**Date:**	11/03/2015
Project Manager:		**Date:**	

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