Investment Evaluation Summary (IES)

Project Details:

Project Name:	Air Break Switches Unit Replacement
Project ID:	00481
Thread:	Overhead
CAPEX/OPEX:	CAPEX
Service Classification:	Standard Control
Scope Type:	A
Work Category Code:	REOHS
Work Category Description:	Replace OH Switchgear
Preferred Option Description:	Collection of asset information. Apply to 100% of units Replacement of whole ABS, with “see-saw” handle. Apply to approximately 10% of units. Management of risk exposure through implementation of operational practices. Apply to 100% of units. Removal of ABS from service. Apply to approximately 5% of units. Ongoing condition assessment as a part of five year pole inspection program. Apply to 100% of units. Ongoing maintenance as a part of twenty year program. Apply to 100% of units. Ongoing replacement of units. Apply to approximately five units per year.
Preferred Option Estimate (Nominal Dollars):	$13,279,253

	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27
Unit ($)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Volume	139	139	139	5	5	5	5	5	5	5
Estimate ($)										
Total ($)	$1,993,723	$1,993,723	$1,993,723	$71,717	$71,717	$71,717	$71,717	$71,717	$71,717	$71,717

Governance:

Project Initiator:	Jack Terry	**Date:**	19/03/2015
Thread Approved:	David Ellis	**Date:**	02/11/2015
Project Approver:	David Eccles	**Date:**	30/10/2015

Document Details:

Version Number:	1

Related Documents:

Description	URL
IES Document	http://projectzone.tnad.tasnetworks.com.au/business-projects/nis-program/DD17SAM/Deliverables/Overhead%20Systems%20and%20Structures/REOHS%20AROSW%20ABS%20Switchgear%20Replacement/Investment%20Evaluation%20Summary%20-%20Air%20Break%20Switches%20R1.docx

NPV Document	http://projectzone.tnad.tasnetworks.com.au/business-projects/nis-program/DD17SAM/Deliverables/Overhead%20Systems%20and%20Structures/REOHS%20AROSW%20ABS%20Switchgear%20Replacement/Air%20Break%20Switch%20Options%20NPV%20R1.xlsm

Section 1 (Gated Investment Step 1)

1. Background

1. Air Break Switches (ABSs)

Air Break Switches (ABSs) also known as ganged isolators, are HV switching assets that allow the connection and disconnection of sections of the HV network under load. A single operating lever that is located 5m up the pole is used to operate the device from open and closed states. This lever is normally accessed using a ladder and requires a physical force to operate. This factor can be mentioned when prioritising replacement since those that have not be operated for a long time or had maintenance) could be prone to failure as a result of sticky mechanism!

. TasNetworks has 4161 units currently in service at voltage 33kV, 22kV and 11kV

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2. Recent Failures

Recent failures show that the particular failure mode being restricted to Asea Brown Boweri (ABB) type ABSs. However, it is possible that similar failure may occur with ABSs produced by another manufacturer, or possibly other asset classes, with similar materials and construction process. Other Distribution Network Service Providers (DNSPs) on identification of failures as early as 2006, have issued Safety Alerts and Operating Restrictions for ABB “U”, “R”, and “S” series ABSs. These DNSPs indicated through correspondence that they have implemented programs for the replacement of these series of ABB ABSs.

Figure 1: Damaged ABB air break switch.

Figure 2 ABS porcelain insulator pin that has failed, as a result of steel corrosion.

3. Current population data

TasNetworks' asset information available on ABSs is limited to the device plate IDs and geospatial information, the date that the switch was last operated, and the installation date, for units installed after 2001 (718 of the 4161 units in service). For the remainder of the units in service (3443) the only information available is geospatial information. As the corrosion and corresponding damage to the insulator pins is likely to be more prevalent in older units, this makes it challenging to identify units that are more likely to be damaged through this particular mode. There is no information stored as an asset attribute as to the manufacturer and model of unitAlso known as ganged isolators, Air Break Switches (ABSs) are HV switching assets that allow the connection and disconnection of sections of the HV network under load. A single operating lever that is located 5m up the pole is used to operate the device from open and closed states. This lever is normally accessed using a ladder and requires a physical force to operate . This factor can be mentioned when prioritising replacement since those that have not be operated for a long time or had maintenance could be prone to failure as a result of sticky mechanism!

TasNetworks has 4512 units currently in service at voltage 33kV, 22kV and 11kV.

4. Historical inspection, maintenance and renewal practice

The historical and current approach to the management of ABSs has been the routine inspection of these units (as a part of the pole inspection program), maintenance of the units through the work category AROSW, and replacement of the units if found to be damaged under the switchgear replacement program, REOHS. As there has been no proactive program for the replacement of units previously, the cost for the current regulatory period is significantly higher than in the preceding regulatory period. A summary of the expenditure on air break switch replacements is provided in Table 1.

Table 1 - Capital expenditure on air break switches, by year.

Financial Year	Number Installed	Cost	Unit Cost
2008/2009	1	$25,225	$25,225
2009/2010	0	0	0
2010/2011	3	$29,885	$9,962
2011/2012	2	$22,538	$11,269
2012/2013	6	$94,089	$15,678
2013/2014	3	$29,788	$9,929
6 FY Total	15	$201,525	$13,435

The operational expenditure for air break switches includes the routine inspection of the assets, incorporated in the standard inspection cycle for overhead assets (work category AIOHS). The yearly budget for this work category is approximately $2.5M, but the inspection of ABSs contributes a very small component to this total value. Previously, maintenance of ABSs had been undertaken under the work category AROSW, but historical volumes for this work have been low, with a total of 16 tasks performed over the previous three financial years.

5. Interim risk mitigation measures

As an interim solution, operational procedures have been put in place to mitigate the risk presented by the operation of the ABSs (see Appendix B). Although TasNetworks has only seen the failure of ABB units occur in this way, these operational procedures have been put in place for the operation of all ABS units. The operational procedures[implemented to mitigate the health and safety risks of failure during operation are:

- Visual inspection prior to operation, using iGo 300 action cameras mounted on an insulated pole. This allows the ABS units to be inspected from the ground, to determine if there are any visible defects present in the insulator pins. If damage is identified, the switch is not operated, and another isolation point is utilised.
- Remote operation, using a rope that is tied from the lever and run to the ground (see Figure 3). This is only possible for opening the switch, as closing the switch requires compression force
- Utilisation of a catching net to protect the operator from fragments of porcelain, falling from the switchgear.

While these measures significantly reduce the risk presented by the operation of the switches, they are an interim mitigation measure and do address the root cause of failure. In the instance of failure, units are replaced with a new ABS unit, with polymer insulators that are not prone to the same failure mode. It is now appropriate to develop and deliver a formal strategy that adequately mitigates and/or addresses the risk of failure during operation of ABSs.

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the three steps listed here as operational procedures. I added a note at the bottom to state that failed units are being replaced with new units with polymeric insulators. whether the unit supplies critical infrastructure. of unit as an open point or statutory AIOHS).

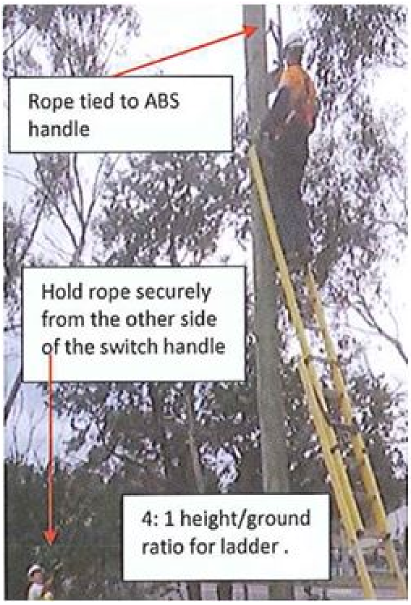


Figure 3: Procedure for operating device using rope (IMS-WPI-11-12).

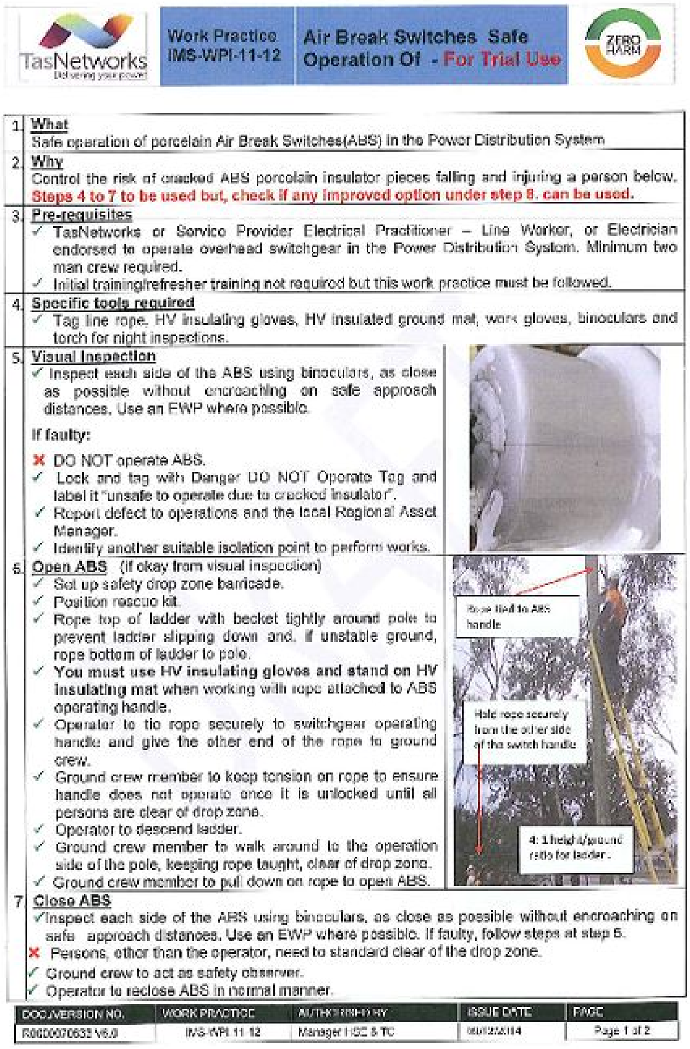
Since December 2011, there have been at least six reported incidents of ABS pin insulators failing, one of which resulted in porcelain hitting an operator. There have been three additional instances where porcelain pin insulators have been identified as damaged, and consequently the ABS has not been operated.

If an ABS insulator fails without resulting presenting a health and safety incident, it is possible that the field crews may not report the occurrence of this failure in Aurora Energy's Risk Management and Safety System (RMSS). The number of failures as reported by the incidents in RMSS possibly provides a lower estimate of the number of actual failures of ABS insulator discs. Of the nine incidents recorded in RMSS, only two instances had the device plate ID recorded; one near Zeehan, and the other near New Norfolk. There is therefore insufficient data to attribute the failure of these units to particular environmental conditions or age.

With the lack of information available for each of the assets in this asset class, it is not possible to, with any certainty, make an informed decision, analysis nor prioritisation of risk pertaining to TasNetworks population of ABSs .

Figure 4 - Work Practice - IMPS -WPI-11-12

Air Break Switches -Safe Operation of- For Trial Use



TasNetworks
Delivering your power

Work Practice IMS-WPI-11-12 | Air Break Switches Safe Operation Of - For Trial Use

ZERO HARM

1. **What**
Safe operation of porcelain Air Break Switches(ABS) in the Power Distribution System

2. **Why**
Control the risk of cracked ABS porcelain insulator pieces falling and injuring a person below.
Steps 4 to 7 to be used but, check if any improved option under step 8. can be used.

3. **Pre-requisites**
✓ TasNetworks or Service Provider Electrical Practitioner – Line Worker, or Electrician endorsed to operate overhead switchgear in the Power Distribution System. Minimum two man crew required.
✓ Initial training/refresher training not required but this work practice must be followed.

4. **Specific tools required**
✓ Tag line rope. HV insulating gloves, HV insulated ground mat, work gloves, binoculars and torch for night inspections.

5. **Visual Inspection**
✓ Inspect each side of the ABS using binoculars, as close as possible without encroaching on safe approach distances. Use an EWP where possible.

If faulty:

✗ DO NOT operate ABS.
✓ Lock and tag with Danger DO NOT Operate Tag and label it "unsafe to operate due to cracked insulator".
✓ Report defect to operations and the local Regional Asset Manager.
✓ Identify another suitable isolation point to perform works.

6. **Open ABS** (If okay from visual inspection)
✓ Set up safety drop zone barricade.
✓ Position rescue kit.
✓ Rope top of ladder with becket tightly around pole to prevent ladder slipping down and, if unstable ground, rope bottom of ladder to pole.
✓ **You must use HV insulating gloves and stand on HV insulating mat** when working with rope attached to ABS operating handle.
✓ Operator to tie rope securely to switchgear operating handle and give the other end of the rope to ground crew.
✓ Ground crew member to keep tension on rope to ensure handle does not operate once it is unlocked until all persons are clear of drop zone.
✓ Operator to descend ladder.
✓ Ground crew member to walk around to the operation side of the pole, keeping rope taught, clear of drop zone.
✓ Ground crew member to pull down on rope to open ABS.

7. **Close ABS**
✓ Inspect each side of the ABS using binoculars, as close as possible without encroaching on safe approach distances. Use an EWP where possible. If faulty, follow steps at step 5.
✗ Persons, other than the operator, need to standard clear of the drop zone.
✓ Ground crew to act as safety observer.
✓ Operator to reclose ABS in normal manner.

DOC./VERSION NO.	WORK PRACTICE	AUTHORISED BY	ISSUE DATE	PAGE
R0000070633 V6.0	IMS-WPI 11 12	Manager HSC & TC	08/12/2014	Page 1 of 2

1.1 Investment Need

Investment Need

Since 2011, Aurora Energy and subsequently TasNetworks have seen a number of mechanical failures in the porcelain insulator pins of certain ABSs while the devices are being operated. The most likely mode of failure is a function of moisture ingress through the end connections of the porcelain insulators, resulting in pin corrosion and expansion. These forces are sufficient to compromise the structural integrity of the insulators causing the unit to fail when the device is next operated (see Figure 2).

Figure 2: Porcelain insulator pin that has failed, as a result of steel corrosion.

Under failure the pin insulator disintegrates, sending shards of broken porcelain falling to the ground and the field service operator on the ladder below. This presents an unacceptable health and safety risk to TasNetworks personnel.

Recently, an ABS insulator pin failed mechanically, that was not a result of the operation of the device, but as the device was being removed from service under live line conditions. In the process of installing the live line insulating mats on the conductor segments either side of the air break switch, the air break switch insulator disintegrated and fell, which the operator was fortunately able to catch before it contacted the cross arm. The operator who was performing the work indicated that he did not apply any significant force to the air break to result in its failure.

Although the ABS was isolated from earth (as is standard practice with live line work), if the conductor had contacted a conductive path to earth, there would have been a flashover which presents a high risk to the safety of the live line worker. As a result of this event, an immediate ban has been placed on live line work for ABS units that are suspected to be at risk (all units with the exception of “old school” units).

TasNetworks’ asset information available on ABSs is limited to the device plate IDs and geospatial information. There is no information on the manufacturer, model of unit or the year of installation or any details of the site that are relevant to the operation of the unit.

Aurora Energy’s asset procurement system, Navision contains records of all the ABS units purchased from the year 2005 onwards. The order history of ABSs in Navision indicates that Aurora Energy exclusively utilised ABB “S-Series” air break switches, which has been corroborated through interactions with ABB (who provided sales records from 2008 onwards).

Although there are no details stored on the units currently installed in the network, there are a number of known units installed in the network. Australian and New Zealand distribution utilities have been contacted to obtain details on the air break switches that have been installed in their networks. The purpose of this is to determine if they have been encountering similar issues, and if so, what approach is being taken.

1. ABB, S Series

These units have been installed in the distribution network from at least 1998, but possibly earlier. These units may either be constructed with a horizontal operating motion, or a vertical operating motion, depending on whether the device is to be mounted on the top of the pole or mid pole respectively. The known order numbers of these units are 7503444 for horizontally mounted units and 7503792 for vertically mounted units. At this stage, TasNetworks only has evidence of horizontally operating units with the order number of 7503444 failing, but it is strongly suspected that the vertically mounted units may be susceptible to the same issues. Additionally, it is possible that other ABB units with different order numbers are similarly problematic. ABB has been contacted for clarification on other units that may have been installed in the network.

Prior to November 2005, ABB used a hot-dip galvanized steel as the metal for the insulator pins (see Figure 2). In November 2005, ABB modified the design of these units to use a 304 stainless steel pin (keeping the same order number for both vertical and horizontally mounted units).

ABB provided a statement to TasNetworks that acknowledged that the pins were updated with stainless steel to eliminate possible corrosion, as feedback from end users. However, they have not acknowledged that the pins produced with the galvanised material were faulty, insisting that the failures observed were not a result of a design or manufacturing deficiency.

As the change in design made in 2005 was a result of feedback from end users with respect to corrosion problems, it is possible (unless other evidence arises) that units manufactured with the stainless steel pins are not susceptible to failure. However, as the same order number was maintained after the design change, it is not possible to target particular order numbers for replacement. It is however appropriate to use year of manufacture and the pin material (determined visually) to differentiate between units manufactured before and after the design change. ABB have stated that no other design change has been made to the "S-Series" unit since it was first manufactured.

2. Morlynn/Stanger, HSB

These units are known to have been manufactured by Morlynn Stanger between the years 1986 and 1991, but the manufacture date may extend outside this date range. The model and batch numbers of these units is not known. No failures of these unit types have been observed in TasNetworks' network.

3. Stanger USB Units

These units are known to have been manufactured by Stanger between the years 1993 and 1995, but the manufacture date may extend outside this date range (see Figure 4). The model and batch numbers of these units is not known. At least two of these unit types have had cracking occur in the insulator pins, as a result of pin corrosion (years of manufacture 1993 and 1995). NGK Stanger has been contacted regarding these failures, to determine if the manufacturer is aware of this problem and whether it may be limited to a particular batch or model.

Until further information is received from Stanger as to the details of the design and models, it is not appropriate for any generic actions to be applied to this population of units. The actions to be taken should be reviewed when further information is obtained on the volumes and location of these units in the network, as well as consideration of any other information obtained from the manufacturer.

4. "Old School" units

The manufacturer of these units is not currently known. The model and batch numbers of these units is not known. No failures of these unit types have been observed in TasNetworks' network.

5. Historical inspection, maintenance and renewal

Historical approach the management of the air break switch asset population has included the routine inspection of the assets through overhead asset inspection program (AIOHS). Prior to 2011, Aurora Energy undertook routine maintenance on the population (RMOHS) to ensure that maximum life was extracted from the assets but this program was ceased reduce operational expenditure.

Provision was included for the replacement of air break switches if found to be damaged, under the switchgear replacement program, REOHS. As there has been no proactive program for the replacement of air break switches previously, the volumes of switch replacements and associated costs are low. A summary of historical expenditure on air break switch replacements is provided in Table 1.

Table 1: Capital expenditure on air break switches, by year.

Financial Year	Number Installed	Cost	Unit Cost
2008/2009	1	$25,225	$25,225
2009/2010	0	0	0
2010/2011	3	$29,885	$9,962
2011/2012	2	$22,538	$11,269
2012/2013	6	$94,089	$15,678
2013/2014	3	$29,788	$9,929
6 FY Total	15	$201,525	$13,435

The operational expenditure for air break switches includes the routine inspection of the assets, incorporated in the standard inspection cycle for overhead assets (work category AIOHS). The yearly budget for this work category is approximately $2.5M, but the inspection of ABSs contributes a very small component to this total value.

6. Interim risk mitigation measures

Ideally, an operational ban would be placed on all air break switches in the network to completely eliminate the risk presented by operation of, and work on ABSs. Given the necessity of these devices for network reconfigurations on a daily basis, this is not practical. To align with TasNetworks' position of no appetite for death or serious injury, a number of safety controls have been implemented to manage the operational risk (see Appendices B and C)

The engineering controls currently implemented, adequately address the health and safety risks in the short term but are inadequate for medium/longer term risk mitigation. That is, the current practices in place does not mitigate the risk of death or serious of injury to an employee, to level that is consistent a risk appetite of “no appetite”.

As a consequence of the recent incident involving the mechanical failure of the insulator while performing the removal under live line conditions, a red alert has been issued prohibiting any live line work from being performed on any ABS that is not of the “old school” variety. This further inhibits the flexibility of the operational side of the business to function in an efficient manner. If no targeted program is applied for the removal of these assets, this constraint will impact the business for years into the future, until all problematic units are removed from service reactively.

7. Customer Needs or Impact

The only impact of this project on the customer is the cost impact through implementation of the project. The selected option minimises cost to the customer, while adequately mitigating and/or addressing the risk presented by the issue.

1.2 Customer Needs or Impact

The only impact of this project on the customer is the cost impact through implementation of the project. The selected option minimises cost to the customer, while adequately mitigating and/or addressing the risk presented by the issue.

1.3 Regulatory Considerations

Not applicable.

2. Project Objectives

The proposed project is to implement series of programs to adequately address the health and safety risk to operators when operating air break switches. To facilitate this, it is proposed that additional asset information is collected through a reconnaissance program to firstly classify sites into those that present a risk to operators, and those that do not, and secondly to collect the necessary information to enable TasNetworks to develop an optimal targeted program. For sites that have been identified as dangerous to operate, it is proposed that the risks associated with operation should continue to be managed through the operational procedures that are currently in place. To address the risk in the long term, it is proposed that a targeted replacement program is implemented to remove units in the defective populations from the network.

3. Strategic Alignment

3.1 Business Objectives

Achieving Zero Harm is a key part of enabling TasNetworks to achieve its strategic goal of taking care of its assets, delivering safe and reliable network services while transforming our business. This investment helps achieve this business objective, by mitigating the health and safety risk presented by the operation of these devices

3.2 Business Initiatives

The realisation of condition and risk based asset management capability is central to TasNetworks’ strategic initiative of ‘One TasNetworks’ program. The collection of asset information on the ABS population through the proposed information reconnaissance project aligns with this strategic initiative, and will allow TasNetworks to make informed strategic decisions on the management of ABSs.

4. Current Risk Evaluation

1.Current Risk Evaluation

The main risk of not undertaking this investment is the serious injury or loss of life of a TasNetworks employee, should an ABS fail while being operated.

[What is the risk of not undertaking this investment? I.e. the Do Nothing option.]

[This section explains the current state risk to the business]

2. 5x5 Risk Matrix

[Summarise how this project is aligned with risks in TasNetworks strategic business risk review.]

[Include relevant risk details from the latest strategic business risk review in the table below. All risks included in the review need to be assigned to one of the 7 categories below, as outlined in TasNetworks Risk Management Framework. Multiple risks may occur in the same risk category. Delete those categories that are not applicable]

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
Financial	-	-	-	-
Customer	-	-	-	-
Regulatory Compliance	Failure to comply with Work and Safety Act 2012	Unlikely	Minor	Low
Network Performance	Increased SAIDI due to loss of supply during asset failure on operation	Unlikely	Minor	Low
Reputation	-	-	-	-
Environment and Community	-	-	-	-
Safety and People	Serious injury or death as a result of asset failure.	Unlikely	Major	Medium
	Injury that takes greater than 5 days to return to work	Possible	Moderate	Medium

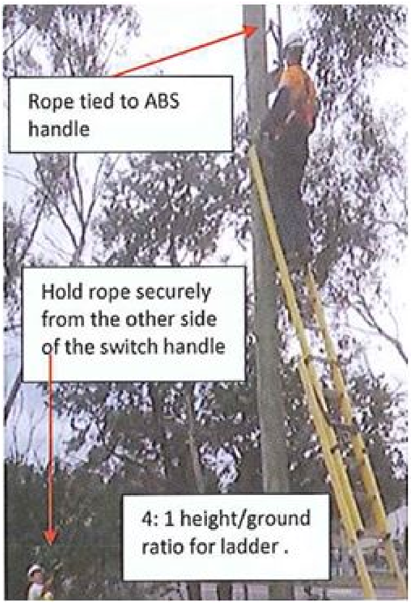


Figure 3: Procedure for operating device using rope (IMS-WPI-11-12).

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
Network Performance	Reduction in reliability performance metrics due to unplanned outages.	Unlikely	Minor	Low
Regulatory Compliance	Failure to comply with Work and Safety Act 2012. Not particularly likely as a specific investigation would have to be undertaken to find that TasNetworks is in breach of the act.	Unlikely	Minor	Low
Safety and People	Serious injury or death as a result of asset failure.	Unlikely	Severe	High
Safety and People	Injury that takes greater than 10 days to return to work	Unlikely	Major	Medium

Section 1 Approvals (Gated Investment Step 1)

Project Initiator:	Jack Terry	**Date:**	19/03/2015
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:

Preferred Solution - Definition

Collection of asset information to classify risk of sites. Manage risk of problematic sites through the selection of an optimal combination of asset replacement, asset modification, operational procedures and removal from service.

To mitigate the risk of the operation of the at risk population of ABSs, a number of solutions have been investigated, which vary in costs, and effectiveness of addressing the operational risk. To meet TasNetworks' needs with respect to risk reduction at the lowest sustainable cost, the preferred option in all cases is the removal from service of all air break switches in the problematic populations (ABB, S Series units with galvanised pins, and Stanger, USB units). Until there is evidence to suggest otherwise, it is appropriate for all other ABS unit types to remain in service. The device (if any) that is required to take the place of the switch should be determined through consideration of the network requirements with respect to network configurability and protection, in alignment with the network management strategy. Where there is opportunity for a protection device to be installed at that location in the network, it may be appropriate to install a recloser in the place of an air break switch. At locations in the network where switches are not necessary, it may be appropriate to remove the switch from service and install conductor loops. Where it is appropriate for an ABS to remain at that point in the network, the optimal solution may be the replacement of only certain components (eg. insulator pins) of that ABS. The solution selected will reflect the suitability of the solution to perform its function with the desired longevity, at the lowest cost. At this stage (until further costing detail is obtained), the preferred option is the removal from service of the entire air break switch unit and replacement with a polymer unit, with an actuating handle. One option investigated, instead of the replacement of the whole unit is retrofitting the unit with a see-saw actuating handle. The installation of this handle allows the operation of the device from the ground with an insulated stick and removes the operator from the drop zone of any porcelain that may fall, under unit failure. This option was not considered appropriate, as in the vast majority of cases, the operational practices achieve the same outcome, without the same level of investment required. Where these operational practices cannot be applied and the unit is required to remain in service, it is prudent to replace the whole unit. If an actuating handle were installed on the unit, it is possible that at some point in the future the unit will fail through the suspected failure mode and require a full replacement. It is not possible for a replacement program to be developed with the current amount of asset attribute and asset condition information. It is appropriate to perform an information collection audit to allow an informed replacement strategy to be developed, and for the air break switch population to be managed effectively in the future. The proposed audit program will be performed from the ground, and will be performed to collect all critical asset information to allow informed decisions to be made on each unit.

5.1 Scope

The scope of this work is:

1. An audit be undertaken to collect critical asset information to be stored appropriately in TasNetworks' asset management systems. This will allow discrimination between ABS units that are known to be defective, and ABS units that are suspected to not be defective.

2. Process changes are implemented to ensure that the appropriate information is stored when air beak switches are installed in the network, either as new units, or replacing existing units.

3. Removal from service of any ABS where cracks are visible.

4. Removal from service of all ABB, S Series units manufactured prior to November 2005 and all Stanger, USB units (assumed 15% of population).

5. For those units to be removed from service, an evaluation process is performed taking into consideration the following factors to determine for each unit, the action to be taken, and the priority with which action is taken.

a. Manufacturer, model and year of unit;

b. Presence of visible cracks in the unit's insulators;

c. Necessity of ABS for operational purposes (eg. open point or alternate supply);

d. Capability of switch to be operated using one of the approved safe methods;

e. Frequency of operation; and f. Whether the ABS supplies, or is involved in the switching for critical infrastructure.

6. Targeted replacement program is deployed, according to outcomes of the evaluation process described in 5.

7. Ongoing condition monitoring of all units, as a part of routine overhead insepctions on a five year rotation cycle.

8. Ongoing maintenance of all units on a twenty year rotation cycle.

5.2 Expected outcomes and benefits

The expected outcome of this work consists of three main components; 1. improvement in the asset information on air break switches (including asset condition information); 2. reduction in the risk of health and safety incidents through the failure of ABS insulators; and 3. Improved operation efficiencies through knowledge of the locations of possibly defective units. Improved asset information will allow TasNetworks to make informed strategic decisions on the management of the problematic units immediately, and the asset population going forward. As problematic units are removed from the network in a prioritised program, the number of instances of failure will reduce. Although the operational practices partially mitigate the risk to the operator during operation, these practices are not perfect and cannot always be applied. Removal of problematic air break switches from service will result in a reduction in the risk of these units to the operators. Another key benefit of the collection of this asset information is an improved operational capability in the interim, through the identification of units that are known to be cracked (not to be operated), units in the suspect population (avoided where possible), and units that are not in the suspect population (used where possible). At this point in time, network switchings are being developed without any information on what the manufacturer and model of the ABS to be used in the switchings are. When a switching is developed, there is a possibility that the ABSs used in the switchings are pre-2006 ABB unit or a Stanger USB unit that has cracks present. In most cases, this will require the switching to be cancelled which results in the wastage of resources and incurs a significant unnecessary cost to the business. Having information stored on the manufacture of each ABS in the network will therefore facilitate improved operational efficiency, as switchings can be developed where possible around units that are known to be safe for operation, reducing the risk of a job being cancelled.

5.3 Regulatory Test

6. Options Analysis

Option No.	Option description
0.	Do nothing or removal of ABS from service.
1.	Replacement of whole ABS, with "see-saw" handle. Apply to 100% of units.
2.	Replacement of whole ABS without "see-saw" handle. Apply to 100% of units.
3.	Replacement of ABS insulators only, with "see-saw" handle. Apply to 100% of units.
4.	Replacement of ABS insulators only, without "see-saw" handle. Apply to 100% of units.
5.	Installation of "see-saw" handle. Apply to 100% of units.
6.	Replacement whole ABS, with "see-saw" handle. Apply to 50% of units. Installation of "see-saw" handle. Apply to 50% of units.
7.	Replacement of whole ABS insulators only, with "see-saw" handle. Apply to 20% of units. Installation of "see-saw" handle. Apply to 60% of units. Removal of ABS from service. Apply to 20% of units.
8.	Collection of asset information. Apply to 100% of units. Replacement of whole ABS, with "see-saw" handle. Apply to approximately 10% of units. Installation of "see-saw" handle. Apply to approximately 10% of units. Management of risk exposure through implementation of operational practices. Apply to 100% of units. Removal of ABS from service. Apply to approximately 5% of units. Ongoing condition assessment as a part of five year pole inspection program. Apply to 100% of units. Ongoing maintenance as a part of twenty year program. Apply to 100% of units. Ongoing replacement of units. Apply to approximately five units per year.

These Options with more detailed description

Option description	
Option 0 - Do Nothing	No action
Option 1	Replacement of 100% of ABSs with polymer insulators ABSs that will not be prone to a similar failure mode, with installation of "see-saw" handle switches to allow operation from the ground. This is the greatest cost option but provides complete proactive mitigation of the risks associated with unit failure, and removes the operator from other danger associated with climbing the pole.
Option 2	Replacement of 100% of ABSs with polymer insulators ABSs that will not be prone to a similar failure mode, without installation of "see-saw" handle switches to allow operation from the ground. This is a high cost option to proactively mitigate the risks associated with device failure. Does not remove the operator from other danger associated with climbing the pole.
Option 3	Replacement of 100% of ABS insulators, with polymer insulators that will not be prone to a similar failure mode, with installation of "see-saw" handle switches to allow operation from the ground. This is a high cost option that provides complete proactive mitigation of the risk of insulator pin failure, and removes the operator from other danger associated with climbing the pole. Not replacing the rest of the unit means that frame may fail earlier, than if whole unit was replaced.
Option 4	Replacement of 100% ABS insulators, with polymer insulators that will not be prone to a similar failure mode, without installation of "see-saw" handle switches to allow operation from the ground. This is a high cost option that provides complete proactive mitigation of the risk of insulator pin failure, but does not remove the operator from other danger associated with climbing the pole. Not replacing the rest of the unit means that frame may fail earlier, than if whole unit was replaced.
Option 5	Installation of "see-saw" handle switches on 100% of units to allow operation from the ground. Removes the operator from other danger associated with operating the device and climbing the pole. However, this option doesn't do anything to proactively address failing assets.
Option 6	See option 1. Apply to 50% of units. See option 5. Apply to 50% of units.
Option 7	See option 1. Apply to 20% of units. See option 5. Apply to 60% of units. Removal of ABS from service. Apply to 20% of units.
Option 8	Collection of information of all units through reconnaissance program, to determine the necessity of replacement of units, and improve the quality of the evaluation and prioritisation process. See option 1. Apply to 10% of units. See option 5. Apply to 10% of units. Removal of ABS from service. Apply to 5% of units. Management of risk exposure of all ABSs through implementation of operational practices. These operational practices are those that are already being applied for the operation of any ABS in the network. These measures are acceptable to address the risks associated with ABSs that are operated less frequently. Apply ongoing condition assessment program to 100% of units as a part of the pre-existing five year pole inspection program. This program will be extended to include the use of "iGo 300" action camera with insulated pole to inspect at ABS height. Apply ongoing maintenance program (on twenty year cycle) to 100% of units as a part of the existing allocated works in AROSW. Appropriate maintenance practices and procedures will be developed in consultation with the manufacturer. Ongoing replacement of units (approximately five per year) that have been identified as defective through routine inspection program detailed above. This will mitigate against the risk of failure for units that were not identified and replaced in the original group. This provides a business as usual approach to the management of the air break switch population.

1. Comparison of these options against the investment drivers

This option matrix provides a comparison of the options against the investment drivers

Option description	
Option 0 - Do Nothing	No action
Option 1	Replacement of 100% of ABSs with polymer insulators ABSs that will not be prone to a similar failure mode, with installation of "see-saw" handle switches to allow operation from the ground. This is the greatest cost option but provides complete proactive mitigation of the risks associated with unit failure, and removes the operator from other danger associated with climbing the pole.
Option 2	Replacement of 100% of ABSs with polymer insulators ABSs that will not be prone to a similar failure mode, without installation of "see-saw" handle switches to allow operation from the ground. This is a high cost option to proactively mitigate the risks associated with device failure. Does not remove the operator from other danger associated with climbing the pole.
Option 3	Replacement of 100% of ABS insulators, with polymer insulators that will not be prone to a similar failure mode, with installation of "see-saw" handle switches to allow operation from the ground. This is a high cost option that provides complete proactive mitigation of the risk of insulator pin failure, and removes the operator from other danger associated with climbing the pole. Not replacing the rest of the unit means that frame may fail earlier, than if whole unit was replaced.
Option 4	Replacement of 100% ABS insulators, with polymer insulators that will not be prone to a similar failure mode, without installation of "see-saw" handle switches to allow operation from the ground. This is a high cost option that provides complete proactive mitigation of the risk of insulator pin failure, but does not remove the operator from other danger associated with climbing the pole. Not replacing the rest of the unit means that frame may fail earlier, than if whole unit was replaced.
Option 5	Installation of "see-saw" handle switches on 100% of units to allow operation from the ground. Removes the operator from other danger associated with operating the device and climbing the pole. However, this option doesn't do anything to proactively address failing assets.
Option 6	See option 1. Apply to 50% of units. See option 5. Apply to 50% of units.
Option 7	See option 1. Apply to 20% of units. See option 5. Apply to 60% of units. Removal of ABS from service. Apply to 20% of units.
Option 8	Collection of information of all units through reconnaissance program, to determine the necessity of replacement of units, and improve the quality of the evaluation and prioritisation process. See option 1. Apply to 10% of units. See option 5. Apply to 10% of units. Removal of ABS from service. Apply to 5% of units. Management of risk exposure of all ABSs through implementation of operational practices. These operational practices are those that are already being applied for the operation of any ABS in the network. These measures are acceptable to address the risks associated with ABSs that are operated less frequently. Apply ongoing condition assessment program to 100% of units as a part of the pre-existing five year pole inspection program. This program will be extended to include the use of "iGo 300" action camera with insulated pole to inspect at ABS height. Apply ongoing maintenance program (on twenty year cycle) to 100% of units as a part of the existing allocated works in AROSW. Appropriate maintenance practices and procedures will be developed in consultation with the manufacturer. Ongoing replacement of units (approximately five per year) that have been identified as defective through routine inspection program detailed above. This will mitigate against the risk of failure for units that were not identified and replaced in the original group. This provides a business as usual approach to the management of the air break switch population.

Summary of these Options in Total Costs

Option	Total Costs ($)
Option 0 - Do Nothing	-
Option 1	-
Option 2	-
Option 3	-
Option 4	-
Option 5	-
Option 6	-
Option 7	-
Option 8	$7,611,804.28

A Summary of Risks associated with Option 0 compared to the TasNetwork's risk appetite-

The main risks associated with selecting option 0 are

- Serious injury to or death of personnel as a result of falling porcelain caused by failure of ABS during operation. Under TasNetworks' risk appetite statement, TasNetworks has **no appetite** for the death or serious injury of its workers.
- Inability to make informed decisions as a result of lack of asset information. Under TasNetworks' risk appetite statement, TasNetworks has a **low appetite** for the inadequate planning and management of asset investment/renewal /maintenance programs.

An economic analysis of Options 0 to 8

The table below summarises the options based on NPV with reason for selction or rejection.

Option No.	Option description	NPV	Reason got selection/rejection
Option 0 - Do Nothing	Apply no active replacement/modification of assets. Ongoing replacement of units. Apply to approximately 5 units per year.	$0	Does not address risk.
Option 1	Replacement of whole ABS, with "see-saw" handle. Apply to 100% of units.	-$34,218,761	Excessive cost.
Option 2	Replacement of whole ABS without "see-saw" handle. Apply to 100% of units.	-$26,303,147	Excessive cost.
Option 3	Replacement of ABS insulators only, with "see-saw" handle. Apply to 100% of units.	-$23,614,646	Excessive cost.
Option 4	Replacement of ABS insulators only, without "see-saw" handle. Apply to 100% of units.	-$15,699,032	Excessive cost.
Option 5	Installation of "see-saw" handle. Apply to 100% of units. Ongoing replacement of units. Apply to approximately 5 units per year.	-$7,915,614	Excessive cost. Doesn't prevent failure.
Option 6	Replacement whole ABS, with "see-saw" handle. Apply to 50% of units. Installation of "see-saw" handle. Apply to 50% of units. Ongoing replacement of units. Apply to approximately 2.5 units per year.	-$21,067,187	Excessive cost.
Option 7	Replacement of whole ABS insulators only, with "see-saw" hande. Apply to 20% of units. Installation of "see-saw" handle. Apply to 60% of units. Removal of ABS from service. Apply to 20% of units. Ongoing replacement of units. Apply to approximately 4 units per year.	-$11,593,120	Excessive cost.
Option 8	Collection of asset information. Apply to 100% of units Replacement of whole ABS, with "see-saw" hande. Apply to approximately 10%	-$4,227,374	Low cost. Adequately addresses risk.

Qualitative Risk Comparison Matrix

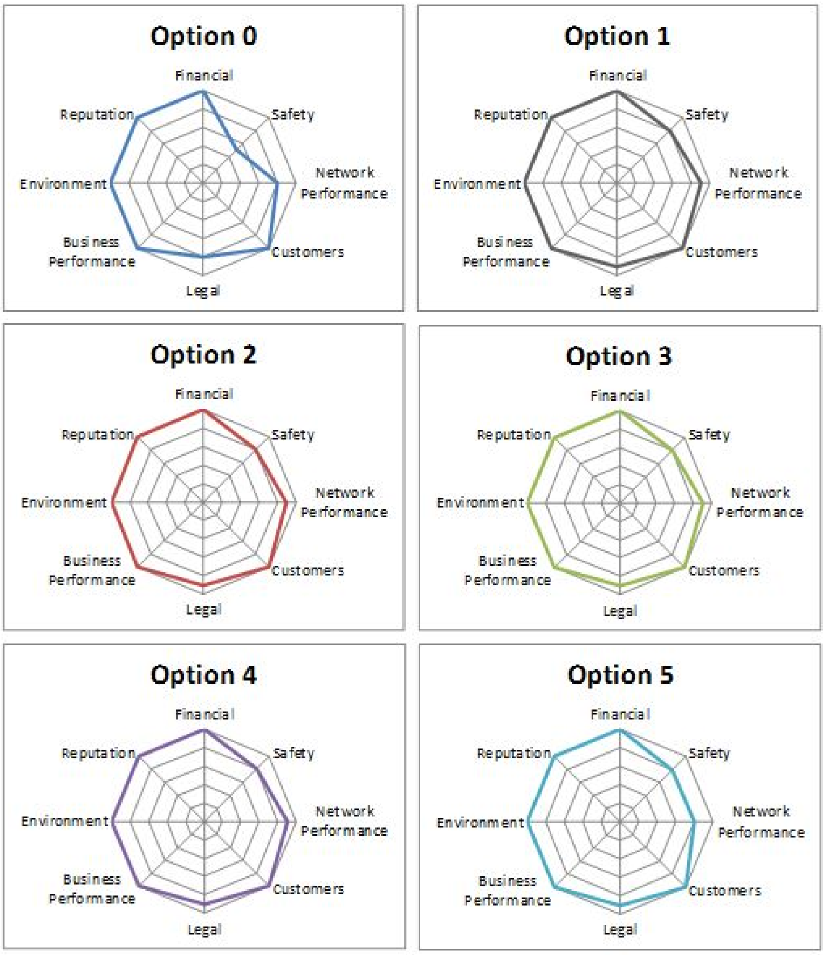
The project options each have a different impact on the future asset risk.

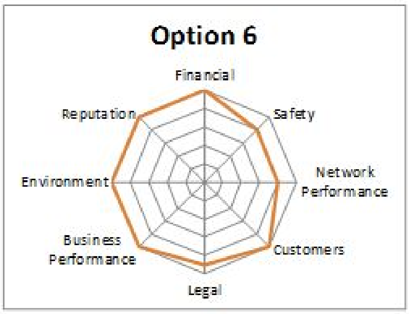
The table below provides a summary of the risk considerations in terms of the 5 x 5 corporate risk matrix and provides the input to the spider web risk diagrams.

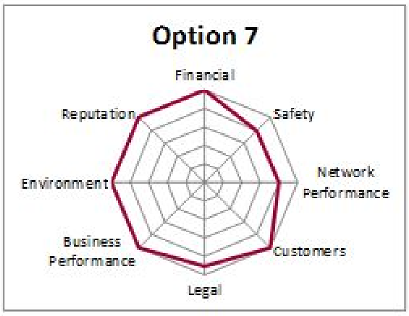
Qualitative Risk Evaluation Matrix

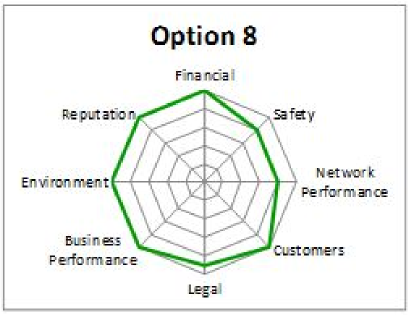
	Option 0 Do Nothing			Option 1 Full Replace w Handle			Option 2 Full Replace no Handle			Option 3 Ins Replace w Handle			Option 4 Ins Replace no Handle			Option 5 Install Handle			Option 6 50% Opt and 50% Opt 5			Option 7 20% Opt 1, 60% Opt 5, 20% RFS			Option 8 10% Opt 1, 10% Opt 5, 5% RFS		
	Likelihood	Impact	Risk	Likelihood	Impact	Risk	Likelihood	Impact	Risk	Likelihood	Impact	Risk	Likelihood	Impact	Risk	Likelihood	Impact	Risk	Likelihood	Impact	Risk	Likelihood	Impact	Risk	Likelihood	Impact	Risk
Financial loss per annum			ERROR			ERROR			ERROR			ERROR			ERROR			ERROR			ERROR			ERROR			ERROR
			NC			NC			NC			NC			NC			NC			NC			NC			NC
			NC			NC			NC			NC			NC			NC			NC			NC			NC
Safety			Medium			Low			Low			Low			Low			Low			Low			Low			Low
	Unlikely	Major	Medium	Rare	Moderate	Low	Rare	Moderate	Low	Rare	Moderate	Low	Rare	Moderate	Low	Rare	Moderate	Low	Rare	Moderate	Low	Rare	Moderate	Low	Rare	Moderate	Low
	Possible	Moderate	Medium			NC			NC			NC			NC			NC			NC			NC			NC
Network Performance			Low			Low			Low			Low			Low			Low			Low			Low			Low
	Unlikely	Minor	Low	Rare	Minor	Low	Rare	Minor	Low	Rare	Minor	Low	Rare	Minor	Low	Unlikely	Minor	Low	Unlikely	Minor	Low	Unlikely	Minor	Low	Unlikely	Minor	Low
			NC			NC			NC			NC			NC			NC			NC			NC			NC
Customers			ERROR			ERROR			ERROR			ERROR			ERROR			ERROR			ERROR			ERROR			ERROR
			NC			NC			NC			NC			NC			NC			NC			NC			NC
			NC			NC			NC			NC			NC			NC			NC			NC			NC
Regulatory, Legal and Compliance			Low			Low			Low			Low			Low			Low			Low			Low			Low
	Unlikely	Minor	Low	Rare	Minor	Low	Rare	Minor	Low	Rare	Minor	Low	Rare	Minor	Low	Rare	Minor	Low	Rare	Minor	Low	Rare	Minor	Low	Rare	Minor	Low
			NC			NC			NC			NC			NC			NC			NC			NC			NC
Business Performance			ERROR			ERROR			ERROR			ERROR			ERROR			ERROR			ERROR			ERROR			ERROR
			NC			NC			NC			NC			NC			NC			NC			NC			NC
			NC			NC			NC			NC			NC			NC			NC			NC			NC
Environment			ERROR			ERROR			ERROR			ERROR			ERROR			ERROR			ERROR			ERROR			ERROR
			NC			NC			NC			NC			NC			NC			NC			NC			NC
			NC			NC			NC			NC			NC			NC			NC			NC			NC
Reputation and Management Effort			ERROR			ERROR			ERROR			ERROR			ERROR			ERROR			ERROR			ERROR			ERROR
			NC			NC			NC			NC			NC			NC			NC			NC			NC
			NC			NC			NC			NC			NC			NC			NC			NC			NC

The Spider web risk diagrams for each Option - from Option 0 to Option 8 .









In these spider web risk diagrams , as a result of their equivalent capability to address the risks identified, options 1-8 have the same risk profiles.

As compared with option 0, each of the options offer

- significant reduction in the exposure to health/safety risk;
- minor reduction in the exposure to network performance and legal risks.

6.1 Option Summary

Option description	
Option 0	Do nothing
Option 1	Replacement of whole ABS, with “see-saw” handle. Apply to 100% of units.
Option 2	Replacement of whole ABS without “see-saw” handle. Apply to 100% of units.
Option 3	Replacement of ABS insulators only, with “see-saw” handle. Apply to 100% of units.
Option 4	Replacement of ABS insulators only, without “see-saw” handle. Apply to 100% of units.
Option 5	Installation of “see-saw” handle. Apply to 100% of units.
Option 6	Replacement whole ABS, with “see-saw” handle. Apply to 50% of units. Installation of “see-saw” handle. Apply to 50% of units.
Option 7	Replacement of whole ABS insulators only, with “see-saw” handle. Apply to 20% of units. Installation of “see-saw” handle. Apply to 60% of units. Removal of ABS from service. Apply to 20% of units.
Option 8 (preferred)	Collection of asset information. Apply to 100% of units Replacement of whole ABS, with “see-saw” handle. Apply to approximately 10% of units. Management of risk exposure through implementation of operational practices. Apply to 100% of units. Removal of ABS from service. Apply to approximately 5% of units. Ongoing condition assessment as a part of five year pole inspection program. Apply to 100% of units. Ongoing maintenance as a part of twenty year program. Apply to 100% of units. Ongoing replacement of units. Apply to approximately five units per year.

6.2 Summary of Drivers

Option	

Option 0	Health and safety - No mitigation of health and safety risks presented by operation of the units. Network performance - No reduction in unplanned outages due to unit failure. Regulatory compliance - Does not achieve compliance with health and safety act 2012. Low Cost
Option 1	Health and safety - Partial mitigation of health and safety risks presented by operation of the units. Network performance - Reduction in unplanned outages due to unit failure. Regulatory compliance - Achieves compliance with health and safety act 2012. High Cost
Option 2	Health and safety - Partial mitigation of health and safety risks presented by operation of the units. Network performance - Reduction in unplanned outages due to unit failure. Regulatory compliance - Achieves compliance with health and safety act 2012. Moderate Cost
Option 3	Health and safety - Partial mitigation of health and safety risks presented by operation of the units. Network performance - Reduction in unplanned outages due to unit failure. Regulatory compliance - Achieves compliance with health and safety act 2012. High Cost
Option 4	Health and safety - Partial mitigation of health and safety risks presented by operation of the units. Network performance - Reduction in unplanned outages due to unit failure. Regulatory compliance - Achieves compliance with health and safety act 2012. Moderate Cost
Option 5	Health and safety - Partial mitigation of health and safety risks presented by operation of the units. Network performance - Reduction in unplanned outages due to unit failure. Regulatory compliance - Achieves compliance with health and safety act 2012. Cost - Low
Option 6	Health and safety - Partial mitigation of health and safety risks presented by operation of the units. Network performance - Reduction in unplanned outages due to unit failure. Regulatory compliance - Achieves compliance with health and safety act 2012. Cost - Moderate
Option 7	Health and safety - Partial mitigation of health and safety risks presented by operation of the units. Network performance - Reduction in unplanned outages due to unit failure. Regulatory compliance - Achieves compliance with health and safety act 2012. Cost - Moderate
Option 8 (preferred)	Health and safety - Partial mitigation of health and safety risks presented by operation of the units. Network performance - Reduction in unplanned outages due to unit failure. Regulatory compliance - Achieves compliance with health and safety act 2012. Cost - Low

6.3 Summary of Costs

Option	Total Cost ($)
Option 0	$4,545,650
Option 1	$91,463,089
Option 2	$69,257,886
Option 3	$72,735,809
Option 4	$50,530,605
Option 5	$26,750,854
Option 6	$59,216,264
Option 7	$35,295,977
Option 8 (preferred)	$13,279,253

6.4 Summary of Risk

1. **Summary of Risk**

The main risks associated with selecting option 0 are

- Serious injury to or death of personnel as a result of falling porcelain caused by failure of ABS during operation. Under TasNetworks' risk appetite statement, TasNetworks has **no appetite** for the death or serious injury of its workers.
- Inability to make informed decisions as a result of lack of asset information. Under TasNetworks' risk appetite statement, TasNetworks has a **low appetite** for the inadequate planning and management of asset investment/renewal /maintenance programs.

6.5 Economic analysis

Option	Description	NPV
Option 0	Do nothing	$0
Option 1	Replacement of whole ABS, with “see-saw” handle. Apply to 100% of units.	-$146,251,670
Option 2	Replacement of whole ABS without “see-saw” handle. Apply to 100% of units.	-$109,228,204
Option 3	Replacement of ABS insulators only, with “see-saw” handle. Apply to 100% of units.	-$115,027,060
Option 4	Replacement of ABS insulators only, without “see-saw” handle. Apply to 100% of units.	-$78,003,594
Option 5	Installation of “see-saw” handle. Apply to 100% of units.	-$37,023,467
Option 6	Replacement whole ABS, with “see-saw” handle. Apply to 50% of units. Installation of “see-saw” handle. Apply to 50% of units.	-$91,637,568
Option 7	Replacement of whole ABS insulators only, with “see-saw” handle. Apply to 20% of units. Installation of “see-saw” handle. Apply to 60% of units. Removal of ABS from service. Apply to 20% of units.	-$51,464,414
Option 8 (preferred)	Collection of asset information. Apply to 100% of units Replacement of whole ABS, with “see-saw” handle. Apply to approximately 10% of units. Management of risk exposure through implementation of operational practices. Apply to 100% of units. Removal of ABS from service. Apply to approximately 5% of units. Ongoing condition assessment as a part of five year pole inspection program. Apply to 100% of units. Ongoing maintenance as a part of twenty year program. Apply to 100% of units. Ongoing replacement of units. Apply to approximately five units per year.	-$14,074,964

6.5.1 Quantitative Risk Analysis

None

6.5.2 Benchmarking

The proposed approach to the management of ABS insulator pin failure is consistent with the approach of other Australian DNSPs. Ergon had ABB U (12kV), S (24 kV) and R series (36 kV) units installed in their network, that were failing under the same failure mechanism that TasNetworks has observed. They immediately implemented an immediate program to have these removed from the network, which was completed for each of these air break switch models by 2014. Energex had ABB U (12 kV) and R (36 kV) series units installed in their network that were failing under the same mechanism that TasNetworks has observed. They implemented a program to have these removed from the network, replacing them with air break switches with composite post insulators, and load break switches where appropriate. They have indicated that as a result of their replacement program, they have few ABB units remaining in their network. Given the range of unit models and variety of environmental conditions (Queensland/Tasmania) over which failures have been observed, there is indisputable evidence that this failure mode is systemic. As no other design changes have been made to the ABB S Series units since the first design, and TasNetworks has seen S Series units fail that were manufactured from years 1998 – 2005, it is prudent to assume that all S Series units manufactured prior to November 2005 are susceptible to failure. TasNetworks' proposed approach towards this issue therefore represents good industry practice.

6.5.3 Expert findings

See IES for detailed report

It is suspected that the mechanical failure of air break switches insulator pins is restricted to those manufactured by ABB. It is believed that this will not occur in ABSs produced by other manufactures, as the design of the ABS is not conducive to this failure mode. It is understood that ABSs manufactured by other companies apply a different sealant method, which is not susceptible to moisture ingress through the same mode observed in the ABB units. Additionally, the steel pins used in the ABB units are only extruded partially into the insulator section. When the ABB ABSs are operated, this therefore results in the insulator pin taking a substantial portion of the shear load that would otherwise be taken by the steel pins.

Based on this theory, it is appropriate to only apply corrective actions to those units that are known to fail by the described failure mode. However, without further evidence it is prudent to apply the risk mitigation operational procedures to the whole ABS population.

6.5.4 Assumptions

6.5.4.1 General Assumptions

1. Existing ABS asset information is correct, where available.

2. Without further knowledge, 10% of the population is assumed to be ABB, S Series or Stanger USB units, at risk of failure

3. Reconnaissance program may be conducted in this regulatory period, under existing budgets and will not result in the removal/deferral of other work programs.

4. Of the asset fleet, approximately 5% of units are unnecessary/redundant for switching.

6.5.4.2 Economic Assumptions

1. Cost of new ABS with polymer insulator is $3,590 per unit.

2. Cost of polymer insulators for retrofit is $930 per unit (3x2 pins).

3. Cost of remote handle, for retrofit is $664 per unit.

4.Cost of materials for mitigation of risk through operational practices is $200 per crew (100 crews).

5.Unit rates for live line workers and inspectors (including overheads) are $120.00 and $100.40 per hour respectively.

6.Unit rates for EWP vehicle and inspector vehicle (including overheads) are $22.50 and $7.18 per hour respectively.

7.Replacement of ABS requires 6 men (2 traffic, 4 Live Line), and takes 8 hours.

8.Retrofitting of ABS insulator pins requires 6 men (2 traffic, 4 Live Line), and takes 8 hours.

9.Installation of remote handle requires 5 men (2 traffic, 3 Live Line), and takes 4 hours.

10.One off inspection of ABS takes one inspector 15 minutes.

11.Incremental time increase for performing ABS inspection in routine pole inspection program is 5 minutes.

Section 2 Approvals (Gated Investment Step 2)

Project Initiator:	Jack Terry	**Date:**	19/03/2015
Project Manager:		**Date:**	

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