Asset Management Plan

Connection Assets - Distribution

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Authorisations

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Responsibilities

This document is the responsibility of the Network Asset Strategy Team, Tasmanian Networks Pty Ltd, ABN 24 167 357 299 (hereafter referred to as "TasNetworks").

The approval of this document is the responsibility of the Leader, Strategic Asset Management.

Please contact the Network Asset Strategy Team Leader with any queries or suggestions.

- Implementation All TasNetworks staff and contractors.
- Compliance All group managers.

Disclaimer

Reference documents

R954721 – TasNetworks Strategic Asset Management Plan

R40766 – TasNetworks Asset Management Policy

R909655 – TasNetworks Risk Management Framework

Record of revisions

Revision	Details	Date
4.0	R19 update	30/11/2018
5.0	Document created with R24 Template	31/10/2022

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1. Purpose

The purpose of this document is to describe for Connection Assets and related assets:

- TasNetworks' approach to asset management, as reflected through its legislative and regulatory obligations and strategic plans.
- The key projects and programs underpinning its activities.
- Forecast capex and opex, including the basis upon which these forecasts are derived.

2. Scope

This document covers Connection Assets for the distribution network. The scope of this document is to provide relevant background, analysis and justifications behind the connection assets programs for the upcoming regulatory control period.

This management plan does not cover underground services and other privately owned assets.

3. Management strategy and objectives

This asset management plan has been developed to align with both TasNetworks' Asset Management Policy, Strategic Asset Management Plan and Strategic Objectives. This management plan describes the asset management strategies and programs undertaken to manage the Connection Assets.

For these assets, the management strategy focuses on the following objectives:

- Safety will continue to be our top priority and we will continue to ensure that our safety performance continues to improve.
- Service performance will be maintained at current overall network service levels, whilst service to poorly performing reliability communities will be improved to meet regulatory requirements.
- Network resilience needs to improve and network related fire starts need to be minimised.
- Cost performance will be improved through prioritisation and efficiency improvements that enable us to provide predictable and lowest sustainable pricing to our customers.
- Customer engagement will be improved to ensure that we understand customer needs, and incorporate these into our decision making to maximise value to them.
- Our program of work will be developed and delivered on time and within budget.

4. Description of the asset portfolio

- The assets covered by the Connection Assets Management Plan are:
- Overhead service conductors
- Service fuses
- Connectors
- Meter panels
- LV metering current transformers
- HV metering voltage transformers
- Neutral impedance monitoring devices (CablePI).

4.1 Overhead service conductors

Approximately 213,000 installations are connected to the distribution network via overhead service conductors.

A mixture of conductor types is used including:

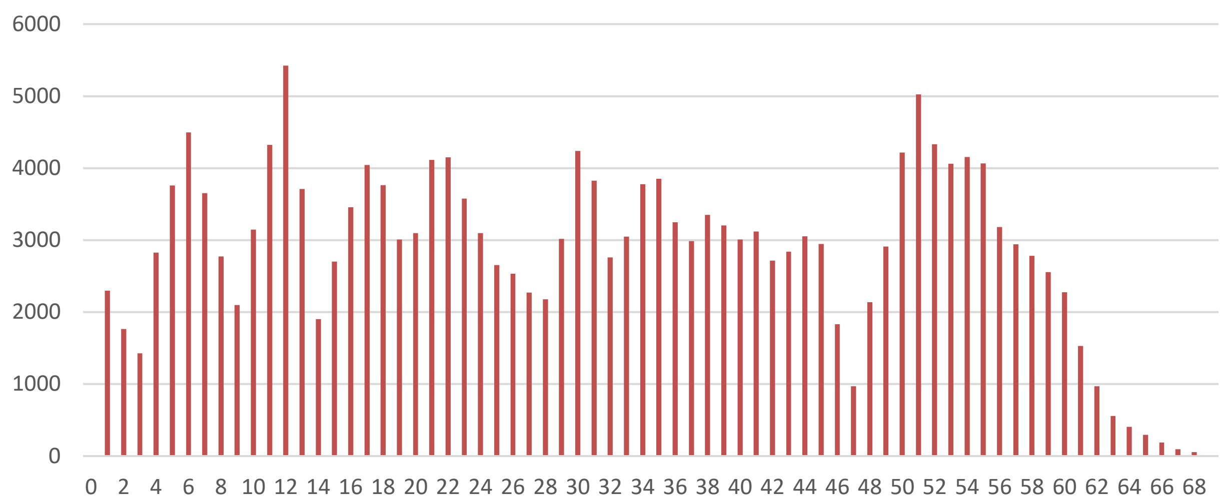
- Open wire copper;
- Figure 8 Copper;

- 10 and 16 mm2 twisted Copper;
- PVC and Twisted Copper PVC; and
- 25 mm2 Low Voltage Aerial Bundled Conductor (LV ABC) Aluminium.

Since 2001, aluminium LV ABC has been the standard conductor type used for overhead services. Figure 8 Copper, PVC and Twisted Copper PVC 10 mm2 services have been discontinued for many years and are included on a substandard list that will trigger a service replacement when work is required on the asset.

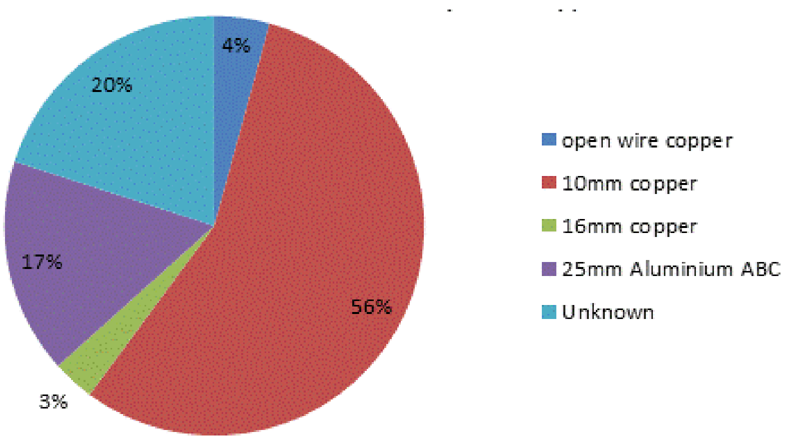
Service conductors have previously not been captured in TasNetworks' asset management system (SAP), meaning that the location and type of overhead service conductor is unknown across the entire fleet. TasNetworks is in the process of undertaking a state-wide data collection audit program to capture asset data for all service assets within Tasmania, with the audit expected to be completed in 2023. TasNetworks will continue to use an estimated age profile of LV services, based on pole ages, until actual asset install data becomes available. This age profile is shown in Figure 1 below.

Figure 1 Estimated age profile of LV services



Previous sample audits estimated that there are approximately 44,000 10mm copper service wires remaining in the network. 10mm service conductor was last installed in 1978. Therefore, the youngest of the fleet will be approaching 45 years with an estimate the oldest approaching 60 years. Analysis of failure mode of 10mm copper has identified moisture ingress due to embrittlement of the insulation as the conductors age, allowing for active to neutral flashover. Enhanced failure data, able to determine service wire failure by type, available over an 18 month period, showed 10mm copper service conductors having the highest volume of failures. The identified high failure rate and the ageing of 10mm copper past its end of life initiated a proactive replacement program.

Figure 2 Service wire failure by asset type



In 2017 TasNetworks reviewed its LV servicing strategy and performed a due diligence risk assessment resulting in TasNetworks initiating a 7 year replacement program of all 10mm copper service conductors, commencing in 2019-20. This also included commencing a state-wide audit to identify and capture asset data for all service assets within Tasmania.

As of 2022, TasNetworks is in a transitional phase of the LV service strategy, implementing neutral monitoring through meter data analytics to effectively monitor the condition of LV service assets and prioritise their replacement based on condition. Neutral monitoring is now accepted in the electrical industry as the most effective and efficient method of determining the condition of an LV service. By neutral monitoring and proactively replacing LV services based on condition, poor condition LV service assets can be targeted more effectively than full replacements of certain asset types.

The details of this strategy are outlined in section 6.1 Neutral Monitoring Strategy.

4.2 Service fuses

Service fuses protect the service wire and distribution network from failures within an installation and are usually located at the point of attachment.

As with service conductors, a mix of service fuses is installed in the network. Since 2004, the standard fuse type for new and upgraded service installations has been the Michaud 100 Amp fuse. Older types such as Henley, Stanger 55 A and Stanger 30 A are included on a substandard list that will trigger a service fuse replacement when work is required on the asset.

Sicame PF100 fuses are also included on the substandard list for replacement as a high priority, due to the high failure rate of this particular fuse type. A targeted replacement program was implemented in 2007, meaning that the population in the network is now very small. Sicame PF100 fuses are replaced upon discovery during service replacements and upgrades.

Nilcrom fuse fittings mounted on the meter panel are an identified defect and must be removed from service whenever they are found. Nilcrom single blade fuses have a known failure mode, due to loose connections of the fuse carrier to the fuse holder, creating high resistance connections which have resulted in instances of meter panel fires. Due to the age of Nilcrom fuses, they are likely to be found on asbestos meter panels, which means the replacement of the Nilcrom fuse fitting will also require a meter panel replacement.

4.3 Connectors

Various fixtures and fittings are installed on the network and these are generally replaced when other assets are replaced or repaired. Since 2001, the standard connector used is an insulated IPC type connector. These connectors are not reusable and must be replaced when other service assets are replaced or repaired.

4.4 Meter panels

TasNetworks has legacy ownership of meter panels installed prior to December 2017. There are approximately 280,000 meter panels installed in the network.

Panels installed prior to 1984 contain a small amount of asbestos (5-10%). Whilst the advice of independent consultants indicates that the asbestos is safe as long as the particles are not disturbed by drilling or cutting, TasNetworks has made the decision to replace asbestos meter panels when the meters are replaced at an installation, as it is the most cost effective and efficient timing for replacing these meter panels.

4.5 Low voltage metering current transformers

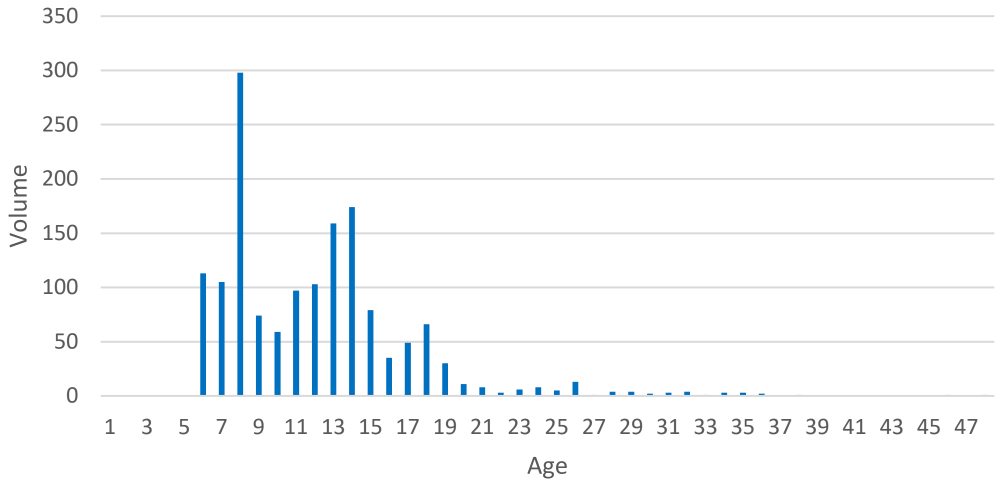
As at June 2022 there were approximately 1,500 sets of LV metering current transformers (**CTs**) with Type 6 meters (TasNetworks legacy meters) installed in the network. The age profile of metering CTs is shown in Figure 3.

A set of metering transformers usually consists of three transformers (one for each phase). In order to comply with National Electricity Rules (**NER**) obligations TasNetworks must test every CT once every 10 years.

This obligation drives a metering equipment testing program, from which it is expected a certain percentage will not meet the required accuracy and condition standards and will, therefore, require replacement.

TasNetworks is currently the Metering Coordinator (**MC**) for these CT meters and responsible for the compliance testing of the CTs. As TasNetworks' type 6 meters are replaced by advanced meters, TasNetworks will no longer be the MC for those sites and the responsibility of compliance testing will transfer to the new Meter Provider.

Figure 3 Age profile of installed metering CTs



4.6 High voltage metering transformers

Approximately 110 HV metering voltage transformers (**VTs**) are installed on the network. An audit was conducted in 2006 to check the condition and compliance of all these assets, from which work practices at the time dictated that all substandard VTs be replaced.

This audit established that most of TasNetworks' metering VTs are in good serviceable condition. Compliance with the NER requires that these devices be tested every 10 years, with non-compliant devices being replaced. As TasNetworks no longer owns any of the meters connected to these HV VTs, the responsibility of compliance testing now rests with the Meter Providers for these sites.

4.7 CablePI

CablePI is a small device that plugs into a domestic power point and monitors the impedance of the neutral. The device acts to alert customers of a potentially hazardous situation before a shock occurs.

In 2009, CablePI devices were distributed to all households in Tasmania as a strategy to manage the risk associated with broken neutrals. The TasNetworks asset register does not record each individual CablePI. Each residential installation was provided a device free of charge (approximately 210,000 devices) and a further 30,000 devices were delivered to businesses.

Since it was distributed, CablePI has detected more than 3,400 faults, including some that could have resulted in an electric shock. Of these, 190 were dangerous neutral faults, more than 1,080 were active conductor faults, and more than 789 voltage issues were found on TasNetworks' low voltage network.

In 2022 TasNetworks discontinued supplying new CablePI devices, moving to managing broken neutral risk through neutral integrity monitoring using advanced meter data analytics. TasNetworks will continue to provide support and callouts to CablePI devices until the advanced meter rollout in Tasmania is complete.

5. Associated risk

5.1 Risk management framework

TasNetworks has developed a Risk Management Framework for the purposes of assessing and managing its business risks, and for ensuring a consistent and structured approach for the management of risk is applied.

An assessment of the risks associated with the Connection Assets has been undertaken in accordance with the Risk Management Framework.

The quantification of risk is supported by the Health Based Risk Management (**HBRM**) framework. This approach allows the risks of individual assets to be quantified against the defined assessment.

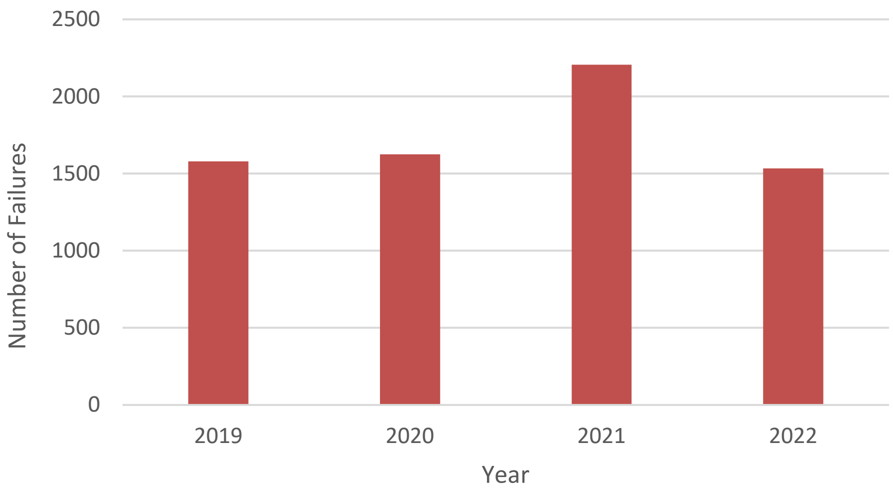
Due to the level of risk identified in some of the assessment criteria a requirement to actively manage these risks has been identified. See section 5.3 for more information.

5.2 Performance data

Connection assets are required to perform without maintenance for the designed life of the asset. Any failure of this asset has a direct impact on customer safety and reliability of supply.

With a state-wide audit of overhead services underway, TasNetworks' service connection assets are in the process of being created in SAP. Once this data set is complete, improved reporting and asset management of connection assets will be possible. With the business move to SAP InService for failure reporting in 2018, a dummy service asset was created in SAP as a way that failures could be captured in the absence of the service conductor asset fleet in SAP. A limitation of the SAP dummy service asset is that it does not separate the specific service assets, so the failure data does not provide a breakdown of which service asset failed (service, fuse or connector).

Figure 4 Service asset failures recorded in SAP



TasNetworks reports on community safety performance measures, including customer shocks reported to the Fault Centre. All customer shocks are investigated and outcomes recorded so trends in shock causes can be monitored. Figure 5 (below) illustrates the causes of the shocks experienced by customers and reported to TasNetworks' Fault Centre since the fourth quarter of 2019-20.

Figure 5 Reported customer shocks

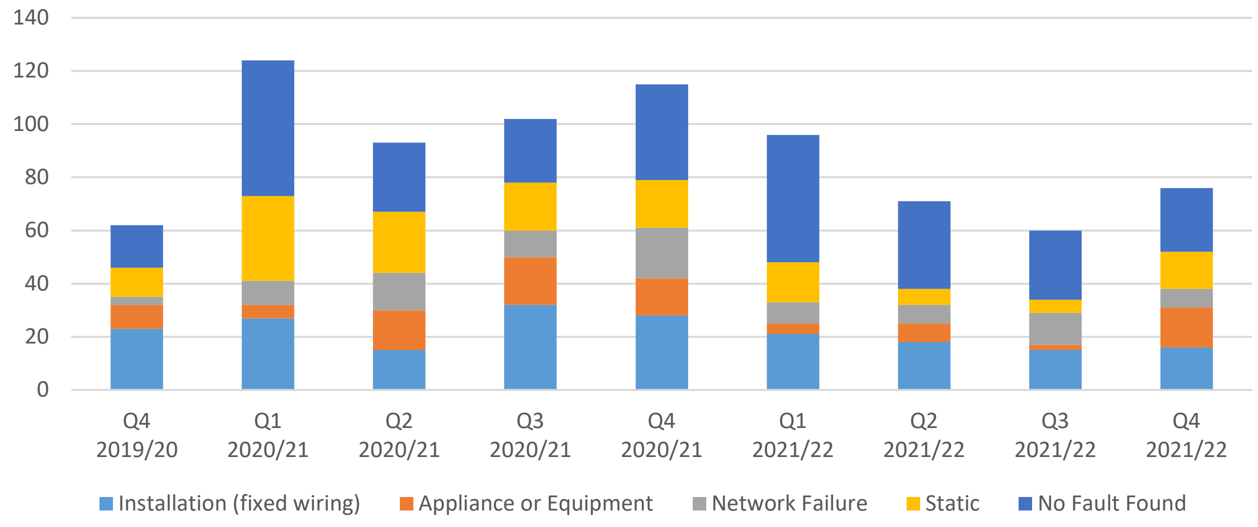
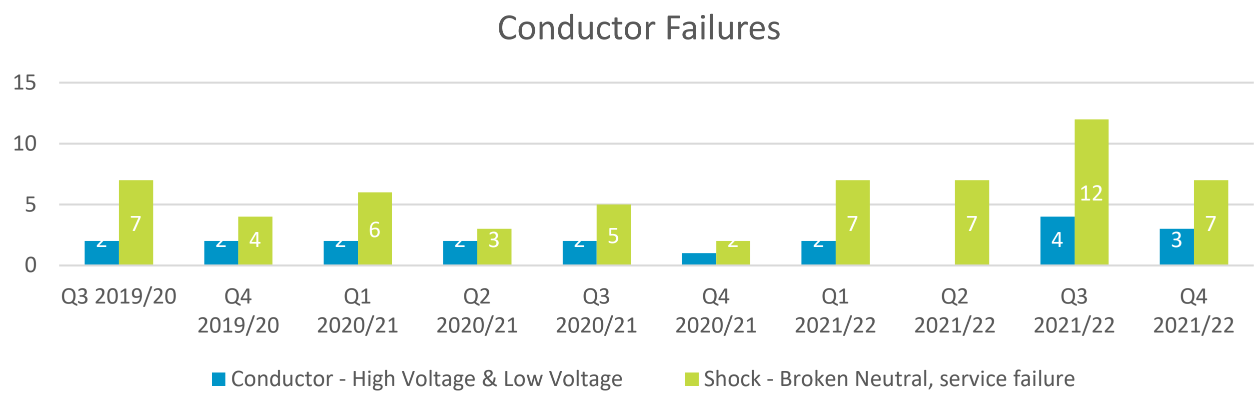


Figure 6 Recorded broken neutral service failures



5.2.1 Benchmarking

TasNetworks participates and works closely with distribution companies in key industry forums such as CIGRE (International Council on Large Electric Systems), IEEE, ANSI, AS/NZ and Energy Networks Australia (**ENA**), to compare asset management practices and performance to ensure we keep abreast of industry good practice and contemporary asset management. In addition, affiliation and representation on Australian Standard and other international standards bodies helps TasNetworks influence designs and standards, and ensure that TasNetworks maintains a strong asset management focus with the objective being continuous improvement.

The large scale roll out of advanced meters in Victoria has provided an opportunity for utilities to monitor and detect the faults in a more proactive and efficient way. As the analytical monitoring approach has been demonstrated to be reasonably practicable, industry expectations are that adoption of this more effective and efficient approach will significantly eliminate the public safety risks associated with neutral integrity failures.

5.3 Asset risks

5.3.1 Service conductor broken neutral

The significant magnitude of the risk of harm from a broken neutral has been demonstrated in the death and injury of a number of people in Australia and is recognised as a serious issue in the electrical supply industry.

Shocks via broken neutral conductors pose a significant risk to the customer. Broken neutral faults are difficult for customers to detect. The customer will still have power, however the current flow is via the earth connection and no longer through the neutral conductor. This means in cases with high impedance earth connections there will be a potential rise on fixtures bonded to earth, such as water pipes, stoves and metal taps. This has the potential to cause an electric shock or electrocution.

TasNetworks has previously mitigated the broken neutral risk with the distribution of CablePI devices. The CablePI device was invented by Aurora Energy in 2007 following the electrocution of a Tasmanian resident by a broken neutral connection. Due to the high reliance on customer involvement, the CablePI device is only partially effective at managing broken neutral risk. TasNetworks' strategy has been to continue with CablePI device until a feasible alternative for detecting broken neutrals is available.

The development of advanced meter data analytics has now progressed significantly, such that neutral integrity monitoring through advanced meter data is the standard being implemented across the industry.

Neutral monitoring is now accepted in the electrical industry as the most effective and efficient method of determining the condition of an LV service. An incident report[1] into a significant neutral failure incident released by the Western Australia safety regulator highlights this point. By neutral monitoring and proactively replacing LV services based off condition, poor condition LV service assets can be targeted more effectively than full replacement of certain asset types.

With the Tasmanian government committing to the accelerated rollout of advanced meters in Tasmania (to be completed 2026) this is now a feasible option in Tasmania. TasNetworks completed a trial in May 2021 of neutral monitoring using data analytics of advanced meter data. Through the success of this trial and the difficulties in procuring more CablePI devices, TasNetworks has moved to a transitional phase of neutral monitoring via advanced meter data as a replacement mitigation for new CablePI devices.

5.3.2 Asbestos meter panels

TasNetworks has legacy ownership of meter panels installed prior to December 2017. There are approximately 280,000 meter panels installed in the network. Panels installed prior to 1984 contain a small amount of asbestos (5-10 per cent). Asbestos can be harmful when inhaled and has been linked to health conditions. The advice of independent consultants indicates that the asbestos is safe as long as the particles are not disturbed by drilling or cutting.

Risk analysis considered the health risks to home owners due to undamaged asbestos meter panels is extremely low. Panels that contain asbestos remain safe for people working on the asset (using approved safe work methodologies, including appropriate PPE) provided the panel is not drilled, cut or damaged. TasNetworks has appropriate work procedures for working safely on asbestos panels.

While the risk posed by undisturbed asbestos meter panels is low, TasNetworks has made the decision to opportunely replace these panels when meters are replaced at an installation with an asbestos panel.

TasNetworks has an agreement with Metering co-ordinators to perform this work when replacing a TasNetworks owned meter. The replacement of the asbestos meter panels at this time allows the new advanced meter to be installed by the Metering co-ordinator without delays affecting the customer's connection.

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1 Investigation report Beldon electrical accident report

5.3.3 Sicame PF100 fuses

In 2007 following a house fire caused by a faulty Sicame PF100 Fuse, a proactive replacement program was implemented to remove Sicame PF100 fuses installed in the network. Between 2007 and 2011, all recorded fuses were removed. Replacement is now managed under the Substandard Service Asset Rule Base.

Figure 7 shows examples of old Sicame PF100 Fuses.

Figure 7 Sicame PF100 Fusesf

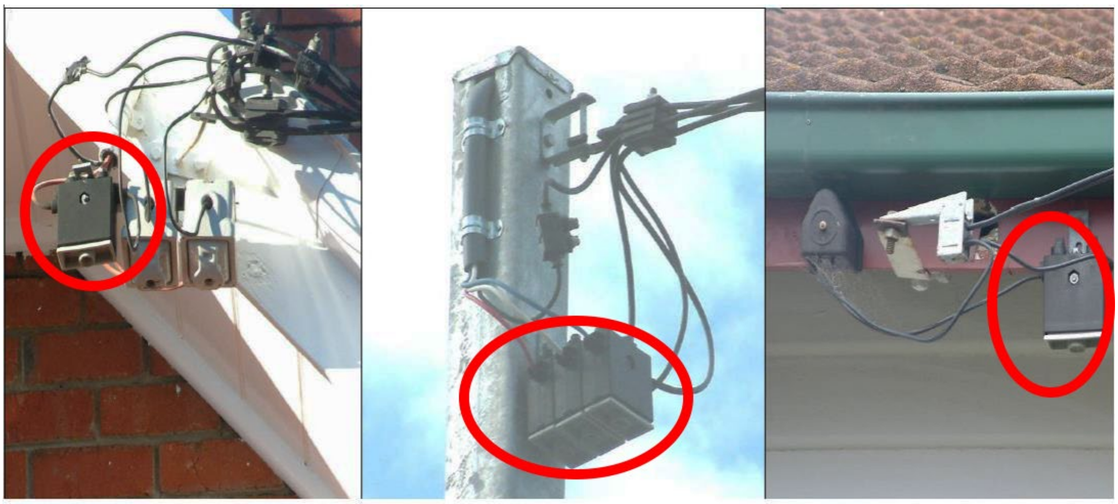

Figure 6: Old Sicame PF100 Fuses

The consequence rating for Sicame fuses is severe, due to the possibility of starting a house fire resulting in a fatality. The likelihood rating has reduced over the years as the frequency of failures has moved from "weeks to months" to "years to decades". All known locations of Sicame fuses have now been removed. Records of product volumes and the number of replacements show that at least 90 per cent of Sicame fuses have been removed from the network. The risk profile for Sicame fuses has now decreased to the same level as all substandard services assets. It is listed as a priority replacement defect in the LV service strategy. As part of the services asset management strategy all overhead services across the state are to be audited to obtain asset and condition data. Following the state-wide audit, and replacement of any identified Sicame PF100 fuses, this risk will be eliminated.

Table 1 Summary of asset risks

Risk Identification		**Risk Analysis (Inherent)**				
Asset	**Risk Description**	**Category**	**Likelihood**	**Consequence**	**Risk Rank**	**Treatment Plan Yes / No**
Service Conductor Service Fuse Service Connector	Significant shock or electrocution from broken neutral failure	Safety and People	Possible	Severe	High	Yes
		Customer	Unlikely	Moderate	Medium	
	Fire start from fallen conductor	Environment and Community	Unlikely	Severe	High	
Meter panels	Possible asbestos health risks of damaged asbestos meter panel	Safety and People	Rare	Severe	Medium	Yes
		Customer	Likely	Moderate	Medium	
	Restricting the rollout of advanced meters and customer's access to electricity service	Regulatory Compliance	Unlikely	Moderate	Medium	
LV CTs	Failed or inaccurate CTs result in inaccurate network and customer billing	Regulatory Compliance	Unlikely	Moderate	Medium	Yes
	Risk of injury from catastrophic failure of asset	Safety and People	Rare	Severe	Medium	
	Supply interruption resulting from failure of CTs	Customer	Unlikely	Moderate	Low	
HV VTs	Risk of injury from catastrophic failure of asset	Safety and People	Rare	Severe	Medium	No
	Failed or inaccurate VTs result in inaccurate network and customer billing	Financial	Possible	Minor	Low	

6. Whole of life management plan

6.1 Neutral monitoring strategy

The development of advanced meter data analytics has progressed so significantly that neutral integrity monitoring and loss of neutral detection through advanced meter data is now the standard being implemented across the industry. With the Tasmanian government committing to the accelerated rollout of advanced meters in Tasmania (to be completed 2026) this is now a viable option in Tasmania.

Following successful trials TasNetworks proposed the transition to Loss of Neutral detection via advanced meter data as a replacement mitigation for new CablePI devices. The CablePI device risk mitigation is deemed only partially effective at managing broken neutral risk due to the high reliance on customer involvement. This approach removes reliance on customer interaction to plug in CablePI devices and notify TasNetworks of alarms. In October 2021 the future supply of CablePI - change of strategy was endorsed by TasNetworks' leadership.

In 2022 TasNetworks implemented a change in strategy for managing the risk of shock from a broken neutral, discontinuing distribution of new CablePI devices and transitioning to Loss of Neutral detection via advanced meter data analytics. TasNetworks will continue to support and service fault response to existing CablePI devices until full coverage of neutral monitoring via advanced meters is reached. Further details of this strategy implementation are contained in the Advanced Meter Data update (section 7).

Neutral monitoring is now accepted in the electrical industry as the most effective and efficient method of determining the condition of an LV service. The implementation of neutral monitoring and proactive replacement of LV services based on condition means that poor condition LV service assets can be targeted more effectively than through overall replacement of certain asset types.

The strategy for the 2024-2029 regulatory control period consists of implementing neutral monitoring through meter data analytics to effectively monitor the condition of LV service assets and prioritise their replacement based on condition. This approach will significantly reduce the likelihood of in-service failure. By 2024-25 a significant portion of the state will have advanced meters installed and close to full coverage of neutral monitoring across the state will be possible.

The benefits of this approach are:

- detection and alert of high impedance neutral faults;
- no customer interaction required to be effective;
- once advanced meter roll out completed, 100% coverage is possible;
- enables data driven decision on replacement of LV service assets, leading to deferral/reduction in REPEX;
- use of advanced meter data for loss of neutral detection allows other use cases to be developed;
- alignment with multiple strategies in TasNetworks' EAM roadmap; and
- now the benchmark set by other utilities across Australia.

This program is a key input into TasNetworks' Future Distribution System Roadmap. The use of advanced meter data for Loss of Neutral detection allows other use cases to be developed including:

- National Electricity Customer Framework medical customer compliance obligations;
- Distribution Management System input;
- Distribution System Operator functionality;

- reliability monitoring; and
- low voltage connectivity model/support.

Acquisition of AMI data and network analytics aligns with the ENA paper on data opportunities for smart networks and the Energy Security Board (**ESB**) Data Strategy consultation paper, as both call for DNSPs to build capabilities to use data for network management, foster cultural exchange and revisit business cases for data opportunities. TasNetworks has actively engaged with the current AEMC rule change process to define minimum standard for provision of power quality data to NSPs. To date we have been successful in negotiating alignment between our data requirements and the preferred option indicated by both ENA and AEMC.

6.2 Preventive and corrective maintenance (opex)

6.2.1 OH Conductor condition inspection – AIOCI

The objective of this program is to conduct a state-wide audit of all overhead services to determine volumes of service asset types and identify defective services to inform the proactive replacement program. The state-wide audit involves conducting field scoping of defective services and obtaining an accurate and manageable data set for TasNetworks' LV service assets. This data set will enable TasNetworks' service assets to be recorded in SAP, facilitating enhanced reporting and asset management capabilities.

The scope and time frame of the audit component has changed as a result of the technical specification development for the outsourcing of this program.

The state-wide audit includes the following components:

- Condition monitoring/asset inspection (an opex function)
- Master Data collection for TasNetworks' asset management systems (a capex function)
- Scoping information for service replacements (a capex function)

This is opposed to a purely 10mm focus condition/defect identification program.

The audit is now being undertaken over an 18 month period, instead of the initial seven year program alongside the replacement program. The program originally had $8.2M allocated, this will not change but the functional areas in which it is funded from will.

The state-wide audit commenced in 2021-22 and, as of August 2022, 99,318 service spans had been audited (out of an expected total 213,000). From these audits 22,070 service spans (22 per cent of inspected spans) met asset engineering/asset strategy "substandard replacement" criteria, including 15,604 spans (15.7 per cent of inspected spans) which have conductors 10mm or smaller and 6,466 (6.5 per cent of inspected spans) which met other substandard replacement criteria.

The following criteria describes the "substandard replacement criteria":

- 10mm or smaller open wire services
- 10mm twisted and flat services
- 16mm services without neoprene sleeves
- 16mm services with LVABC strain clamps
- 16mm services with ramp and wedge clamps

This criteria was derived from the Substandard Servicing Asset Replacement Rule Base (section 7).

Once the state-wide audit is complete and a full services asset data base is collected, future 'condition monitoring' of the services lines will be implemented through neutral monitoring via advanced meter data analytics.

6.2.2 Cable PI services costs – CABPI

To ensure broad coverage with timely and accurate fault response to CablePI alarms, TasNetworks uses the services of electrical contractors to respond to 'red' alarm calls (indicating loss of neutral condition).

TasNetworks engages the services of electrical contractors for the first response to CablePI high impedance alarms. Historically, TasNetworks' Compliance Inspectors handled this function. A move to general electrical contractors as first responders has reduced opex, due to the high volume of faults identified inside installations (not network faults).

This program will be discontinued once the advanced meter rollout across Tasmania is complete, as then loss of neutral detection via advanced meter data will be fully implemented, with fault response completed by TasNetworks crews.

6.2.3 Cable PI marketing costs – CABPI (Historical)

Due to the change in strategy from Cable PI devices to neutral monitoring via advanced meter data, this program has been discontinued. TasNetworks stopped marketing CablePI at end of 2021 and by 2022 stopped sending out CablePI devices, instead guiding customers to request an advanced meter if one had not already been installed. The details of this historical program can be found in appendix A.

6.2.4 Remove redundant services - ARRRS

This allows connection assets which are no longer required to be removed when a supply to an installation is abolished upon customer request, via their retailer.

6.2.5 Meter ancillary equipment inspection - AIANC

This program is for CT and VT equipment inspection and testing. Compliance with the requirements of Schedule 7.3 of the NER requires that all metering CTs and VTs must be tested every ten years. As a result, TasNetworks has an annual testing program in place for LV CTs with Type 6 meters (TasNetworks' legacy meters). Appendix B contains details of the methodology for the transformer compliance testing program.

6.2.6 Meter ancillary equipment repair – ARANC

This program is to replace or repair metering ancillary assets under fault, which have failed in service. Forecast volumes for this program are reducing based on the reduction of number installed in network.

6.2.7 Summary of opex expenditure

Table 2 Table 2: Summary of opex programs and expenditure (budget forecasts)

Project/Program	Func. Area	Program Data										
		Financial year	**FY20**	**FY21**	**FY22**	**FY23**	**FY24**	**FY25**	**FY26**	**FY27**	**FY28**	**FY29**
OH Conductor Condition Inspection	AIOCI	Expenditure ($m)	0.925	0.925	0.925	0.925	0.925	0	0	0	0	0
Remove Redundant Services	ARRRS	Expenditure ($m)	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031
CablePI services costs	CABPI	Expenditure ($m)	0.12	0.12	0.12	0.12	0.12	0	0	0	0	0
CablePI marketing costs	CABPI	Expenditure ($m)	0.16	0.16	0	0	0	0	0	0	0	0
Meter Ancillary CT and VT Equipment Inspection and Testing	AIANC	Expenditure ($m)	0.29	0.29	0.196	0.196	0.196	0.196	0.196	0	0	0
Meter Ancillary Equipment Repair	ARANC	Expenditure ($m)	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0	0	0

6.3 Reliability and quality maintained (capex)

6.3.1 Replace services OH & service fuses – SCSRE

The main driver of this program is public safety, in particular to mitigate the risk of broken neutrals, which is the most significant risk in the LV network. Existing substandard overhead electrical services are required to be replaced to ensure the safety of the property owner, the general public and TasNetworks' personnel.

This strategy is designed to address the following risks:

- customer shocks, through broken neutral conductors;
- reliability of supply;
- quality of supply; and
- possible fire to buildings.

In 2017-18, following a review of its LV servicing strategy and a due diligence risk assessment, TasNetworks trialled a program of service conductor replacement and then, in 2019-20, initiated a 7 year replacement program for all 10mm copper service conductors. The forecasting of volumes for the replacement program has been based on the estimated number of 10mm copper services installed in the network. Previous sample audits estimated the volume of 10mm copper services to be approximately 21 per cent of installed services. Therefore, it was estimated that approximately 44,730 10mm copper services would require replacement over the 7 year program. The state-wide audit will provide more accurate volumes of the various conductor types installed across the network. The state-wide audit commenced in 2021-22 and the audit results so far align with estimations, with 22 per cent of spans being substandard and approximately 16 per cent being 10mm copper services.

This program involves an audit under AIOCI and replacement under SCSRE. As well as 10mm copper conductors, other conductor types identified as being in poor condition or substandard (as per the overhead service replacement rule base) will also continue to be replaced under this program.

TasNetworks' strategy during the 20224-2029 regulatory control period will consist of implementing neutral monitoring through meter data analytics to effectively monitor the condition of LV service assets and prioritise their replacements based on condition.

Neutral monitoring is now accepted in the electrical industry as the most effective and efficient method of determining the condition of a LV service. By neutral monitoring and proactively replacing LV services based on condition, poor condition LV service assets can be targeted more effectively than purely overall replacements of certain asset types. Asset condition and prioritisation will be determined by combining neutral monitoring data and asset data collected from the state-wide audit.

This program excludes private customer work, though some informing of, and liaising with, customers will be required in order to perform replacements of TasNetworks' assets.

This program also capitalises the asset replacement required during replacement of overhead service assets (services and fuses) that operate or fail in service. Forecasting of this proportion of the replacement program is based on historical service related outage information, with a projection of a reduction in failures as proactive replacement work is increased.

6.3.2 Replace Meter Panels – SCMPA

The objective of this program of work is for the replacement of existing type 6 meter panels with asbestos as identified by advanced meter rollout program initiated by Retailer/Metering Co-ordinator (MC).

TasNetworks has an agreement with MCs to perform this work when replacing a TasNetworks owned meter. The replacement of the asbestos meter panels at this time allows the new advanced meter to be installed by the MC without delays affecting the customer's connection.

This program supports the State Government's commitment to the acceleration of the retailer led advanced meter rollout, and will focus on the customer's experience by removing risk from the network at optimal times in order to minimise both cost and customer disruption.

6.3.3 Details of future capex projects/programs

Table 3 Table 3: Program/project details

Project/Program description	Functional area	IES Document	Link to HBRM initiative
Replace OH Services	SCSRE	R2118453	SCSRE Investment Summary (copperleaf)
Replace Meter Panels	SCMPA	R2125412	SCMPA Investment Summary

6.4 Spares management

Spares holdings are assessed during the asset management plan review cycle and minimum and maximum stock levels and spares holdings are amended in alignment with TasNetworks' spares policy.

6.5 End of life management

All decommissioned assets are either recovered for re-use or disposed of to eliminate any hazard on site which may pose a risk to the community. Redundant Connection Assets are inspected and assessed to determine whether they can be re-used and recovered back to store.

All copper and steel conductors and damaged aluminium conductors are recovered for scrap/recycle.

Asbestos meter panels are managed and disposed of safely in accordance with TasNetworks' Asbestos Management Plan.

7. Related standards and documentation

The following documents have been used to either in the development of this management plan, or provide supporting information to it:

1. TasNetworks Transformation Roadmap 2025 (R764285)
2. National Electricity Rules (NER) – Chapter 7
3. TasNetworks Service and Installation Rules
4. Metering (Regulated) Type 6 Asset Management Plan (R301003)
5. Substandard Servicing Asset Replacement Rule Base (R1228882)
6. Asbestos Management Plan (R472616)
7. Historical: LV Service Audit Findings and Conclusions 2006 (R502722)
8. R19 LV Service Strategy Review (R726714)
9. Future Supply of CablePI paper Oct 2021 (R1950588)
10. Advanced Meter Data update Aug 2022 (R2294812)

Appendix A – Historical programs

Cable PI marketing costs - CABPI

The success of the CablePI program relies on customers keeping the devices plugged in and turned on. To maximise plug-in rates, TasNetworks conducted marketing campaigns promoting the benefits of plugging in the device. The plug-in rate was tested by market surveys.

To ensure the CablePI is effectively managing the risk of broken neutrals, a plug-in rate of at least 80 per cent is required. After the initial roll-out of the device in 2009 the measured plug in rate was 87 per cent, however this had fallen to 49 per cent by 2020.

To address this decline in plug-in rates, a marketing campaign was developed for general use across the year. The campaign is designed to be generic, enabling it to be used for multiple years with the following aims:

- provide general awareness of the device;
- encourage customers to plug the device in;
- encourage customers to check it is turned on and working, i.e. the green light is on. This is to also help flush the thermal fuse failures out of the network; and
- encourage customers to contact TasNetworks if they require a new/replacement device.

Plug in rates were monitored twice a year through market surveys to ensure the effectiveness of any marketing.

The market surveys costs around $8,800 per survey with the marketing campaign costing about $160,000 per annum.

Appendix B – Metering transformer compliance testing method

Introduction

This appendix outlines the approach to be taken in the error testing program of metering transformers. It covers LV CTs, HV CTs and VTs for which TasNetworks is the Metering Co-ordinator (**MC**), or for which TasNetworks has agreed to complete testing on behalf of another MC. It should be read in conjunction with TasNetworks' Metering (Regulated) Type 6 Asset Management Plan and outlines the approach TasNetworks will take in error testing metering transformers and in analysing the results.

Strategy

TasNetworks intends to test its metering transformers according to the regime prescribed in table S7.3.2 of the NER, with the LV CT population divided into eight families (A-W). TasNetworks will select 10 per cent of transformers for testing annually.

Site selection

Transformers selected for testing will be selected from sites connected more than 10 years ago or where testing has not been completed for over 10 years. Selection will start with the oldest transformers (most likely to fail) and largest ratios (larger energy consumption).

Test equipment and test points

All current transformer testing will be done in-situ, using the Red Phase 509C Current Transformer Error Tester, which demagnetises each CT before beginning its test procedure. The test points shown in the Table below shall be used. Multi-tap CTs shall be tested on all taps and extended range CTs shall also be tested at the Accuracy Limit current.

The burden used for CT testing shall be 25 per cent of the rated burden of the device in question, and this burden will be resistive. All CTs present at each selected site shall be error tested. All CT error results obtained will be provided to AEMO. Any faulty CTs found will trigger notification of the customer for replacement and the faulty items will be retained so that the failure mechanism can be determined. Table 1 (below) shows the test points for each CT test.

Table 4 CT Test points

% Rated Current	Magnitude Error Limits	Phase Error limits (Minutes)	Phase Error limits (Crad)
5	±1.5	±90	±2.7
20	±0.75	±45	±1.35
100	±0.5	±30	±0.9
200 or 250 (As appropriate for extended range CTs only)	±0.5	±30	±0.9

Installation Inspections

As part of the test procedure each selected metering installation shall also undergo an inspection as prescribed in chapter 7 of the NER. Asset nameplate and rating details will be recorded during each site audit.

HV Metering Installations

TasNetworks is no longer the MC for any Type 1-4 meter installations, so is not responsible for performing any compliance testing on HV metering installations.