Aurora ENERGY

ABN 85 082 464 622

MANAGEMENT PLAN 2011

CONNECTION ASSETS

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0	18 Feb 2011	Original Issue. (NW-#30158001-V2A)	Prepared by	JG
			Reviewed by	DM
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1	17 April 2011	Secondary Review (NW-#30158001-V3)	Prepared by	JG
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2	9 May 2011	Added CAPEX – OPEX Tradeoffs Section (NW-#30158001-V5)	Prepared by	JG
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1. PURPOSE

The purpose of this document is to describe, for Connection Assets:

- Aurora's approach to asset management, as reflected through its legislative and regulatory obligations and Network Management Strategy;
- The key projects and programs underpinning its activities for the period 2012/2013 - 2016/2017; and
- Forecast CAPEX and OPEX, including the basis upon which these forecasts are derived.

2. STRATEGY

The objective of the Network Management Strategy is:

> *Minimise cost of supply to the customer whilst:*
>
> *a. Maintaining network performance;*
>
> *b. Managing business operating risks; and*
>
> *c. Complying with regulatory, contractual and legal responsibilities.*

3. SCOPE

The scope of this document is to provide relevant background, analysis and justifications behind the connection assets thread programs for the upcoming regulatory period.

The assets covered by the Connection Assets Management Plan are:

1. Overhead service conductors to transport the electricity between the grid and the customer installation;
2. Service fuses to provide protection functions in the case of a fault in the consumer mains and to act as an isolation, connection and disconnection point between the distribution system and the customer installation;
3. Fixtures and fittings to connect components together;
4. Meter panels to install metering equipment located in the consumer's metering enclosure;
5. LV metering current transformers for metering installations with greater than 100 amps connected load;
6. HV metering voltage transformers for metering installations connected at high voltage; and
7. Aurora Cable PI devices.

4. DESCRIPTION OF THE ASSETS

4.1 Overhead Service Conductors

Approximately 200,000 installations are connected to the network via overhead service conductors. A mixture of conductor types are used including:

1. Open wire copper;
2. Figure 8 Copper,
3. 10 and 16 mm^2 twisted Copper;
4. 25 mm^2 Low Voltage Aerial Bundled Conductor (LV ABC) Aluminium; and
5. PVC and Twisted Copper PVC.

Figure 8 Copper, PVC and Twisted Copper PVC 10 mm^2 services have been discontinued for many years and are included on a defects list that will trigger a service replacement when identified by a field operator. Aluminium ABC has been used as standard since 2001.

Historically, a run to failure approach has been used to manage the replacement of overhead services due to the large volume of services and low impact of individual failures. Due to limited information of LV service assets, an audit of 10% of the service population was conducted in 2006 to provide a snapshot of asset condition (LV Service Audit Findings, reference 5). This audit indicated that 13% of installed service wires were in poor condition, resulting in a replacement program being initiated in 2007/2008. However, at the time another targeted service replacement program, replacement of Sicame Fuses, was deemed to have higher priority due to their high failure rate and the mode of failure. Therefore funds were diverted for this purpose.

4.2 Service Fuses

Service fuses protect the service wire and distribution network from an installation and are usually located at the point of attachment. As with service conductors, a mix of service fuses is installed. Older types such as Henley, Stanger 55 Amp and Stanger 30 Amp are included on a defects list that will trigger a service replacement when identified by a field operator.

Since 2004, the standard fuse type for new and upgraded service installations is the Michaud 100 Amp fuses.

Sicame fuses are also included on the defect list for replacement as a high priority due to the high failure rate of this particular fuse type. As there has been a targeted replacement program, their population in the network is very small. Therefore Sicame fuses are replacement upon discovery during service replacements and upgrades.

4.3 Fixtures and Fittings

Various fixtures and fitting are installed on the network and these are generally replaced when other assets are replaced or repaired. The connectors installed since 2001 are insulated IPC types that are not reusable and must be replaced when other service assets are replaced or repaired.

4.4 Meter Panels

Approximately 280,000 meter panels are installed. 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, Aurora has made the decision to replace these panels when meters are replaced at an installation with an asbestos panel.

For details on Aurora's asbestos handling policy see the Asbestos Handling Policy and Procedure.

4.5 Metering Current Transformers

There are approximately 4100 LV and HV metering current transformers (CT) installed in the network as at July 2010, with all being less than 50 years old. In order to comply with National Electricity Rules (NER) obligations Aurora 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. Details of this testing program can be found in Section 6.1.1.

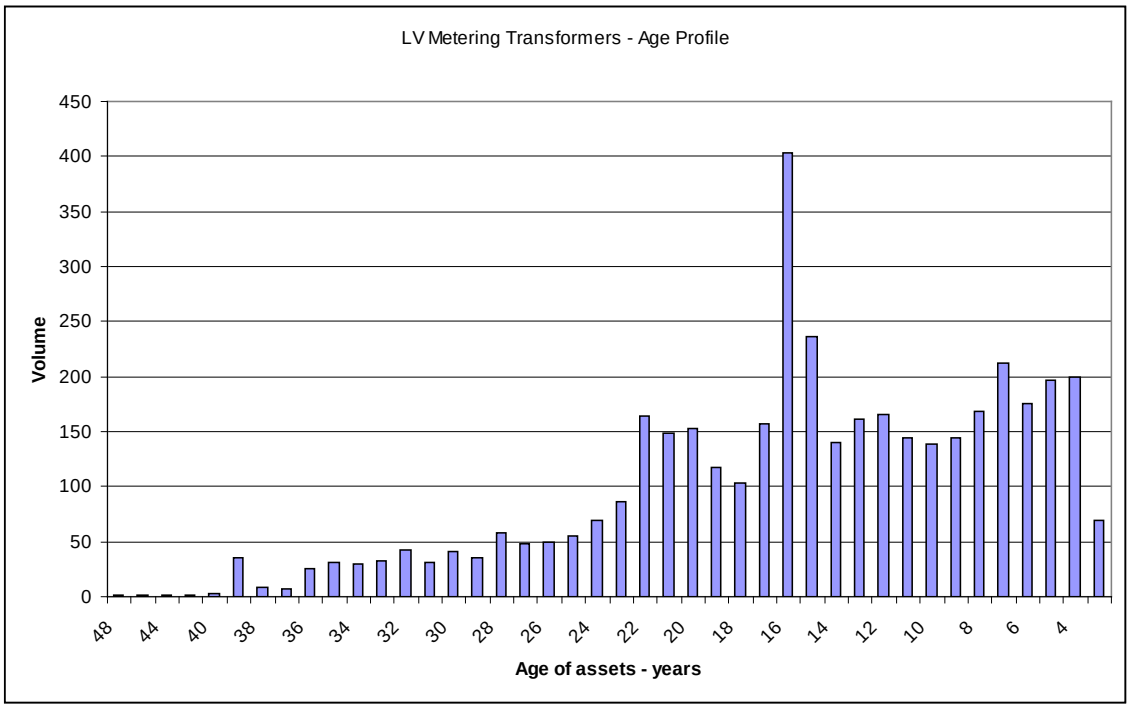

Figure 1: Age Profile of installed metering CTs as at July 2010

4.6 HV Metering Voltage Transformers

Approximately 120 HV metering voltage transformers (VTs) are installed on the network as at July 2010. 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 has established that most of Aurora's metering VTs are in good serviceable condition. Compliance with the NER (amended in 2005) also requires that these devices be tested every 10 years, with non-compliant devices being replaced.

4.7 Cable PI

Aurora's Cable PI broken neutral detectors are classified as an Aurora owned connection asset in the Regulated Asset Base. The cost of providing these devices to the public is therefore incurred through a Connection Assets thread program.

5. FACTORS INFLUENCING ASSET MANAGEMENT STRATEGIES

The principal factors influencing asset management strategies are classified as per objectives set out in Section 2.

5.1 Minimise the Cost of Supply to the Consumer

- Asset selection gives a least cost option over the service life of the asset.
- Ensure renewal activities are only performed when required.

5.2 Managing Business Operating Risks

- Ensuring all risks are identified and have adequate management plans integrated into the business' practices.

5.3 Complying with Regulatory, Contractual and Legal Responsibilities

- Ensuring adequate monitoring and inspection activities cover legislative compliance obligations.
- The CT and VT testing program is designed to comply with:
  - National Electricity Rules (NER) – Section 7.6
  - Tasmanian Electricity Code (TEC) – Sections 9.17 and 9.18

6. MANAGEMENT PLAN

6.1 Capital Expenditure Replacement Programs

The following sections detail all targeted replacement programs for connection assets.

6.1.1 CT and VT Replacement

This program is required for Aurora's compliance with TEC and NER obligations, dictating that any metering equipment that fails testing or is in poor condition must be replaced.

These rules were amended in 2005 requiring mandatory testing once every 10 years. Therefore little historical data or trends exist on typical metering transformer failure rates, making it difficult to forecast a replacement program. Based on the standard asset life of a transformer (40 years) and the current metering transformer population, it is expected that on average approximately three failures will occur per year.

6.1.2 Replace Overhead LV Service Conductor

This program covers the condition based upgrading of service connection assets including service wire, fuses and clamps. It is complimented by the overhead service inspection program will determine the sites that require asset replacement. Current volumes for service replacements are based on the LV Service Replacement Strategy, which splits both normal and complex upgrades across a portion of the 13% of service conductor that is in poor condition. The projected volumes are understated because it is also expected that a portion of this 13% will either fail and be replaced under fault (see Section 6.1.3), or be removed from the system due as an installation being decommissioned (see Section 7.2.1).

6.1.3 Replace Service Wires and Fuses

This program capitalises the asset replacement required during replacement of service assets that operate or fail in service. Forecasting of this replacement program is based on historical service related outage information, which is shown in Figure 2.

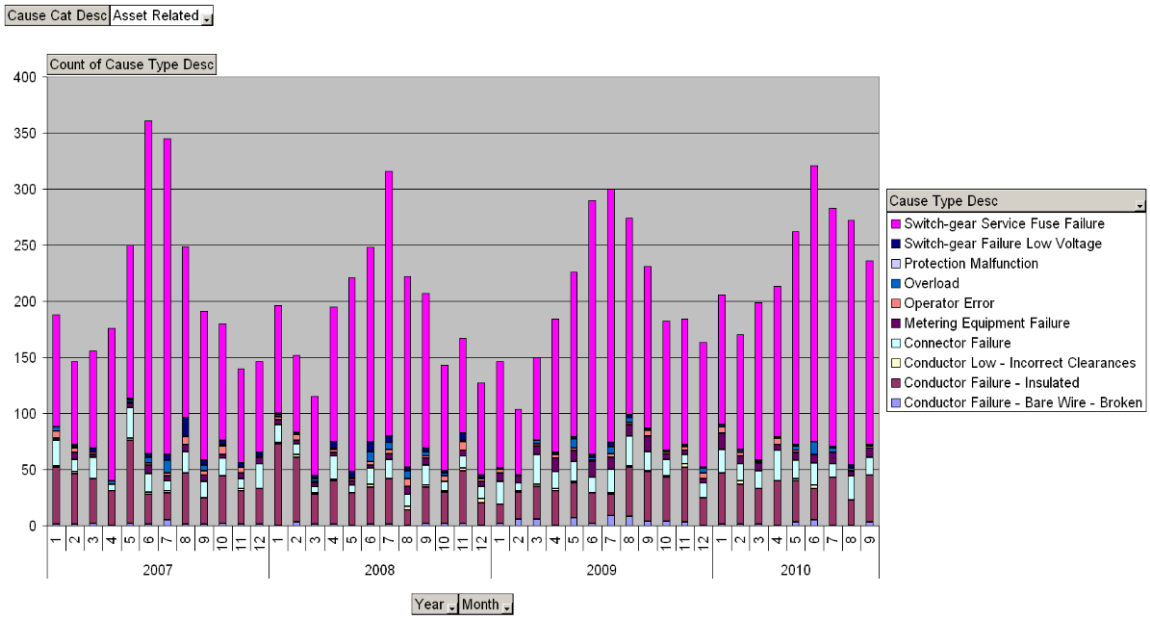

Figure 2: Number of Service Asset Related Outages per Month

Figure 2 shows a consistent trend of service related outages averaging at approximately 1500 per year. Therefore this quantity is split between both the service fuse and service wire replacement programs and forecast as a consistent amount per year over the upcoming regulatory period.

6.1.4 Meter Panel Replacement (SCMPA)

Aurora's service installation rules state that the customer must cover the cost of a meter panel when a new connection is established to an installation; the panel then becomes Aurora's property. This means Aurora is still financially responsible for meter panel replacement.

During customer meter replacement, a meter panel may be found as defective or may contain asbestos. The TEC 9.12 (reference 2) requires that meters be

contained in a fireproof enclosure; meaning defective meter panels must be replaced for compliance. If meter panels are discovered that contain asbestos, these will also be replaced as a duty of care to the customer.

This program is split into two types of work:

1. The capitalisation of meter replacement work done under fault; and
2. The cost of meter panels and other relevant (standard control) connection assets when other (non-fault) replacements are required as detailed above.

Meter panel replacement work (non-fault) has only existed since 2009, because of amendment of Aurora's safety procedures around asbestos. Therefore historical data on typical meter replacement volumes is limited.

It is expected that the necessary expenditure for this program will decrease as more asbestos meter panels are replaced.

7. CUSTOMER GENERATED WORK (NEW INSTALLATIONS)

7.1.1 Customer Generated LV (Service Connections)

Aurora is required to connect new installations to the distribution network via a service connection under our customer charter, which is required under the TEC. Forecast volumes for the next regulatory period are based on a typical historical trend of customer generated service installation work which is shown in Figure 3.

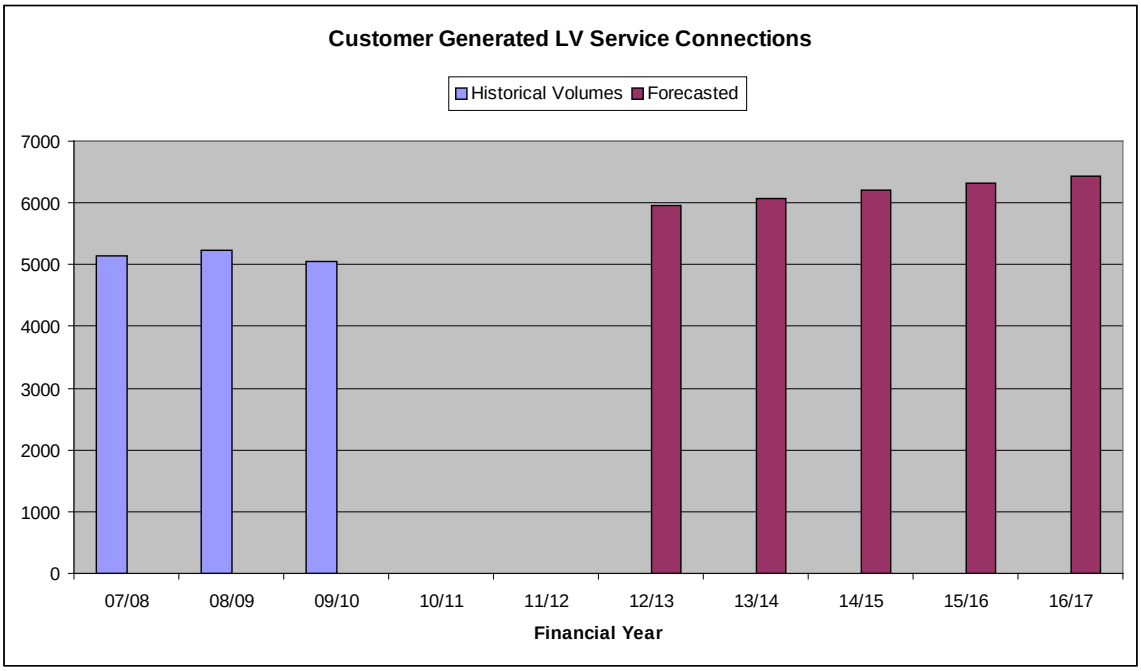

Figure 3: Historical and Forecast Customer Generated Service Connection Work

7.1.2 Install CTs and VTs (New Installations)

New Installations that require transformer connected metering are covered under this program, split into labour and materials components. This work is customer driven and is required for compliance with Aurora's customer charter.

7.1.3 Cable PI

Cable PI devices are supplied to new customers and any reported defective devices will be replaced. Replacement devices are covered under warranty; so projected volumes are based on current consumption costs for Cable PI assets.

Currently, a consistent average of 540 Cable PI devices are issued to customers per week, which is basis on which volumes are forecast.

7.2 Operational Expenditure Programs

The following inspection and monitoring programs are in place for connection assets.

7.2.1 Meter Ancillary CT and VT Equipment Inspection

Compliance with the requirements of Schedule 7.3 of the NER and Section 9.18.2 of the TEC require that all metering CTs and VTs must be tested every ten years. As a result, Aurora has a program in place to test 10%, or 410 transformers, annually. A full testing schedule exists for this program (Metering CT Testing Program Schedule, reference 6)

7.2.2 Overhead Service Conductor Inspection

This inspection program aims to identify defective overhead service conductors and service fuses before these assets fail in service. Assets identified under this program are replaced in the capital overhead service conductor and service fuse replacement programs.

7.2.3 Remove Redundant Services

This allows connection assets to be removed, which are no longer required when a supply to an installation is abolished.

A recent change in work practices may cause a volume shift for this work program.

Historically, if a temporary supply was installed in an incomplete installation, alteration work was required to convert this to a permanent supply. However in order to comply with new B2B procedures for the new Aurora ACP system under the National Electricity Rules (reference 1), such temporary supplies are to be removed from service under this program before a permanent supply can be installed. This shift has been considered when forecasting volumes for the upcoming regulatory period.

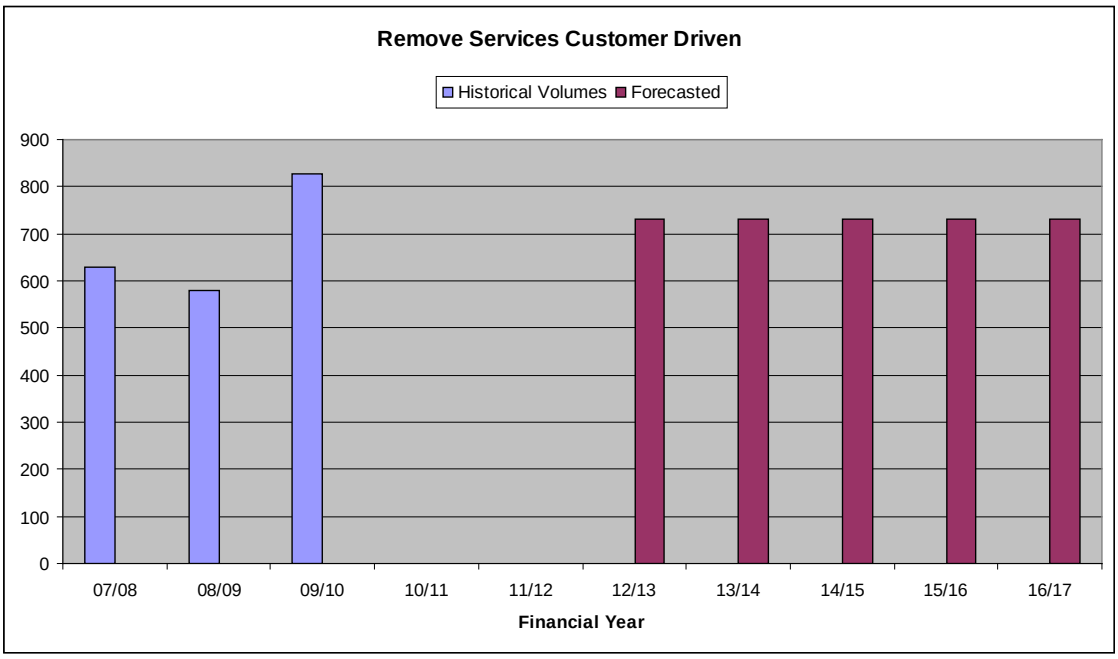

Figure 4: Customer Driven Service Removal Historical and Forecast Volumes

7.2.4 Connection Asset Repair

This program is to replace or repair metering ancillary assets under fault, which have failed in service. Data from the 2007-2010 financial years show increasing trends of costs for this work program, however no certainty exists for an upward trend for the repair needs of existing assets. Forecast volumes for this program therefore assume a steady average failure rate during the upcoming regulatory period, using the 2009/10 financial year as a base.

8. PROPOSED OPEX PLAN

Historically, the Connection Assets has not existed as a thread and therefore comparing historical work to the proposed program of work is difficult. While the budgeted routine maintenance programs for connection assets have historically been met, both funds and resources for inspection programs have been redirected for more business critical issues. Therefore the historical OPEX for connection assets is much lower than budgeted.

For the program of work proposed in the upcoming regulatory period, all proposed volumes of work are based on either compliance for testing of metering transformers, or historical maintenance practices and fault responses. For compliance reasons, inspection programs must now be undertaken under a strict regime. The increase over the next regulatory period is mainly due to the increased metering transformer inspection program to ensure compliance by the end of the period (Section 7.2.1) and the additional funds for removing redundant services (Section 7.2.3). Note that these are both compliance driven programs. Operational activities can be divided into inspection and maintenance programs, which are detailed in Table 1.

Table 1: OPEX 2007/2008 to 2016/2017

OPEX										
	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17
Inspection	$ 839	$ 22,107	$ -	$ 462,607	$ 490,000	$ 519,583	$ 501,649	$ 493,991	$ 482,565	$ 477,983
Maintenance	$ 44,548	$ 72,547	$ 98,396	$ 120,000	$ 285,000	$ 243,212	$ 234,877	$ 231,239	$ 225,889	$ 223,668
Total Actual	$ 45,387	$ 94,654	$ 98,396							
Total Proposed	**$ 338,155**	**$ 744,390**	**$ 509,133**	**$ 582,607**	**$ 775,000**	**$ 762,794**	**$ 736,527**	**$ 725,229**	**$ 708,454**	**$ 701,650**

Note: Most of the proposed connection assets OPEX is new due to compliance requirements.

9. PROPOSED CAPEX PLAN

The proposed capital program of work can be divided into new service connection installations, installation and replacement of metering ancillary equipment and the capitalisation of service replacement done under fault. The installation of service connections and installation or replacement of metering transformers is all compliance driven. The only additional CAPEX has been included in the upcoming regulatory period for the purchasing of Cable PI units.

Table 2: CAPEX 2007/2008 to 2016/2017

CAPEX										
	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17
Install Service Connections	$2,156,597	$1,799,929	$2,100,000	$2,163,000	$2,050,000	$1,812,481	$1,802,460	$1,817,336	$1,821,478	$1,842,946
Metering Ancillary Equipment	$ 399,554	$1,531,957	$1,826,643	$2,078,880	$1,422,143	$1,632,844	$1,627,480	$1,625,139	$1,621,696	$1,620,267
Replace Services	$1,749,759	$1,282,297	$2,500,000	$2,536,000	$2,700,000	$2,305,246	$2,231,782	$2,192,600	$2,141,789	$2,112,792
Total Actual	$4,305,911	$4,614,183	$6,426,643							
Total Proposed	**$3,908,164**	**$5,124,187**	**$7,514,584**	**$6,777,880**	**$6,172,143**	**$5,750,570**	**$5,661,723**	**$5,635,076**	**$5,584,963**	**$5,576,004**

10. CAPEX – OPEX TRADEOFFS

The inspection programs for metering transformers and overhead services will identify assets as either non-compliant or substandard and will therefore require replacement. A relationship exists between these inspection and replacement programs, as assets identified for targeted replacement during inspection programs will drive the capital work required for replacement of such assets. By increasing the scope of inspection programs it is expected that asset replacements will increase. In turn, any asset replacement will defer the inspection requirements of that asset either due to improved condition or because it resets the period required for inspection as required for compliance.

Generally, either a run to failure or run to non-compliance strategy exists for connection assets. Therefore capital work is not deferred through maintenance activities because assets will be replaced rather than maintained.

11. ASSET MANAGEMENT INFORMATION

With the exception of metering CTs and VTs, the Aurora asset register does not currently (as at November 2010) contain specific records relating to the individual connection assets such type, age, condition and location. During the upcoming 20112/2013 to 2016/2017 regulatory period, Aurora plan to complete a project to implement a process and system to record and maintain connection asset data. Completion of this project will enable Aurora to make improved asset management decisions based on accurate asset data. Refer to the Distribution Network IT Strategy (reference 3) for details of this project.

12. RESPONSIBILITIES

The maintenance and implementation of this management plan is the responsibility of the Metering Assets Manager.

Approval of this management plan is the responsibility of the Group Manager – Asset Performance and Information.

A review of this management plan will be conducted annually or upon changes to applicable standards, rules, codes or legislation.

13. REFERENCES

1. National Electricity Rules (NER) – Section 7.6
2. Tasmanian Electricity Code (TEC) – Sections 9.17 and 9.18
3. Distribution Network IT Strategy
4. LV Service Replacement Strategy (NW-#246130)
5. LV Service Audit Findings and Conclusions (NW-#241180)
6. Metering CT Testing Program Schedule (NW-#257901)