

## Network Performance Report

2010/2011



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## Introduction

This report represents Ausgrid's Electricity Network Performance Report for the 2010/11 financial year. The report has been prepared in accordance with the Electricity Supply (Safety and Network Management) Regulation 2008 and follows the outline provided by the NSW Department of Trade and Investment, Regional Infrastructure and Services. The report is designed to report actual performance in the 2010/11 financial year, against the criteria and key performance indicators established in the Network Management Plan. This report therefore complements the Plan and details Ausgrid's performance with respect to:

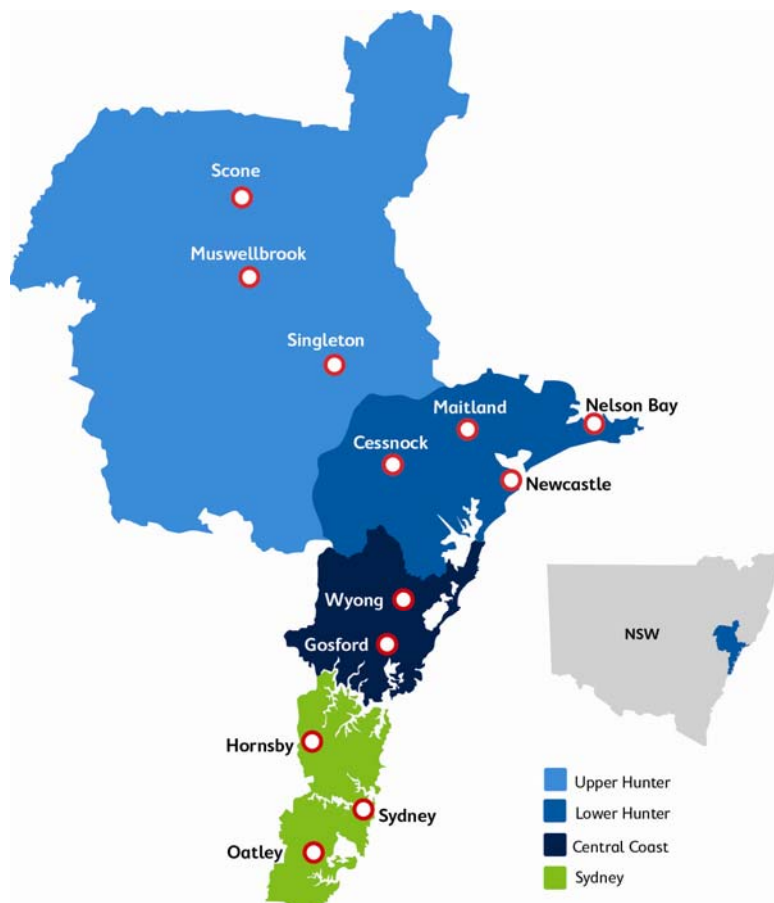
- Network Management;
- Network Planning;
- Asset Management;
- Network Safety;
- Customer Installations;
- Accredited Service Provider Scheme;
- Bushfire Risk Management;
- Public Electrical Safety Awareness; and
- Compliance with the NSW Maritime electricity industry code 'Crossings of NSW Navigable Waters'.

# 1. Profile

Ausgrid's distribution network covers 22,275 square kilometres from Waterfall in Sydney's south to Auburn in western Sydney and the upper Hunter Valley in the north. Ausgrid supplies electricity to 1.6 million customers in Sydney, the Central Coast and the Hunter Region in NSW. Its electricity network powers large and small businesses, as well as major industry including mining, shipping, tourism, manufacturing and agriculture. Until 2 March 2011, the organisation was also a retailer of electricity and gas to more than 1.4 million homes and businesses in New South Wales (NSW), the Australian Capital Territory, Victoria and Queensland.

This report focuses on the performance of Ausgrid's network business which is responsible for the distribution of electricity within our network area (Figure 1).

**Figure 1 – Ausgrid's Network Area**



Ausgrid's principal activities include:

- The ownership and management of assets which make up the electricity distribution network;
- Infrastructure – related construction and maintenance services;
- Purchasing and supplying energy; and
- A range of other services including street lighting, customer connections, safety check ups, energy reviews, metering and 24 hour electrical repairs.

Ausgrid's distribution network includes:

- a subtransmission system of 33kV, 66 kV and 132 kV assets
- a high-voltage distribution system of 5 kV, 11 kV and 22kV assets
- a low voltage distribution system of 240V and 415V assets.
- over 49,000 km of overhead lines and underground cables.

These assets are referred to throughout the report as “the network”. Ausgrid's network customers are therefore customers who are connected to this network of assets. Table 1.1 sets out operator statistics in relation to Ausgrid's network.

## 1.1 Overview

Table 1.1 Distributor Statistics	Number at 30 June 2010	Number at 30 June 2011
Distribution Customer Numbers (Total)	1,605,635	1,619,988
Distribution Customer Numbers – Sydney East Region	317,715	320,550
Distribution Customer Numbers – Sydney South Region	474,516	476,451
Distribution Customer Numbers – Sydney North Region	382,153	385,774
Distribution Customer Numbers – Newcastle Region	196,174	198,784
Distribution Customer Numbers – Central Coast Region	156,384	157,873
Distribution Customer Numbers – Lower Hunter Region	50,135	51,512
Distribution Customer Numbers – Upper Hunter Region	28,558	29,044
Maximum Demand (Aggregated System MW)	5,609	6,072
Feeder Numbers CBD	156	168
Feeder Numbers Urban	1,713	1,739
Feeder Numbers Short Rural	257	261
Feeder Numbers Long Rural	4	4
Energy Received by Dist Network to Year End (GWh)	31,812	31,816
Energy Distributed to Year End (Residential) (GWh)	9,251	9,538
Energy Distributed to Year End (Non-Residential Including un-metered supplies) (GWh)	21,187	21,153
Energy Distributed to Year End (GWh)	30,438	30,691
System Loss Factor (%)	4.32%	3.54%
Transmission System (km)	962	962
Transmission Substation (Number)	43	43
Sub Transmission System (km)	3,641	3,662
Substation - Zone (Number)	185	187
Substation - Distribution (Number)	30,261	30,551
High Voltage Overhead (km)	10,227	10,195
High Voltage Underground (km)	7,178	7,384
Low Voltage Overhead (km)	20,895	20,834
Low Voltage Underground (km)	6,539	6,673
Pole (Number)	510,217	506,101
Streetlights (Number)	250,143	251,298
Employees (Full Time Equivalent Number)	5,780	5,941
Contractors (Full Time Equivalent Number)	545	792

Notes: Distances for overhead and underground lines are circuit km.

System Loss Factor (%), being the difference between electricity received by the distribution network and electricity received by customers (including un-metered supplies) divided by electricity received by the distribution network (allowing for embedded generation), expressed as a percentage

## 1.2 Capital Works Program

In 2009, Ausgrid received regulatory approval from the Australian Energy Regulator (AER) for \$8.5bn of capital investment during the period 2009-14. The robust planning process Ausgrid undertook to develop the program provides evidence that investment at this level is required to sustain our network and business for the next decade and beyond. The capital program represents the largest investment program to be undertaken by Ausgrid. It is the result of a detailed planning review and is an accurate reflection of the needs of the network.

Since the AER 2009 determination, some of the planned investments have changed to meet the changing nature of investment drivers. These changes are taken into account as the detailed project scopes are developed. For example, where peak demand falls below the forecast, network augmentation can be deferred. Lower peak demand has changed Ausgrid's expenditure in grow related investment. However, the total capital expenditure program has not changed significantly. Ausgrid remains committed to supply peak demand, decommission assets in poor condition, meet duty of care obligations, connect customers, and invest in appropriate technology and capabilities.

During the year, Ausgrid spent \$1,578m on the network business including \$1,373m directly on the system capital works program.

<b>Table 1.2 Capital works program trend</b>		
<b>Year</b>	<b>2009/10</b>	<b>2010/11</b>
<b>Capital works program (\$M)</b>	\$1,319	\$1,578m

System capital works during this reporting period include projects to address customer load growth, network reliability, replacement of assets that have reached the end of their service lives, and duty of care projects to address environmental, public safety and asset security issues. Ausgrid's Duty of Care projects have a value of approximately \$50m per year during the 2009/2014 regulatory period.

Major subtransmission network augmentation and reliability projects valued over \$350m were completed during the year. Some of the larger projects completed include new 132kV zone substations at Adamstown, Kurri and Porty Botany, the City West cable tunnel, and connections to TransGrid's Tomago bulk supply point. Committed major network augmentation projects valued over \$536m in construction during the year include new zone substations at Belmore Park (Sydney CBD), Potts Hill, Olympic Park, Royal North Shore Hospital, Rose Bay, Broadmeadow and Empire Bay.

Ausgrid also completed major subtransmission asset replacement projects valued over \$246m during the year. Some notable replacement projects include 132kV zone substations at Bankstown, City North (Sydney CBD), and Jesmond, the refurbishment of Kurnell and Ourimbah 132kV subtransmission substations, and the completion of the Rozelle – City Central 132kV underground cable sections replacements. Major asset replacement projects in construction during the year include 132kV zone substations at Hurstville North, Broadmeadow, Lake Munmorah and Charlestown.

## 2. Network Management

### 2.1 Overview

In line with the Electricity Supply (Safety and Network Management) Regulation 2008, Ausgrid is required to prepare, implement and publish a Network Management Plan. The Plan is available at [www.ausgrid.com.au](http://www.ausgrid.com.au).

The Plan contains high level design, construction, operation and maintenance principles to manage network assets. It also incorporates principles applied to asset utilisation in the areas of safety, reliability, quality of supply and risk management. The Plan has four chapters:

**Chapter 1: Network Safety and Reliability** – provides a framework for Ausgrid's network to provide a reliable and safe supply of electricity. This chapter details how Ausgrid:

- manages its assets and sets out the basis for network investment;
- plans investments;
- provides reference to standards and protocols; and
- identifies areas of the network that require development.

Ausgrid's network planning meets legislative, license compliance and regulatory requirements with wider organisational objectives and business responsibilities. This includes meeting customer expectations for a reliable and safe supply of electricity; managing safety, environmental and security risks associated with network infrastructure and managing the financial performance of the business.

To deliver these objectives, the Network Management Plan focuses on:

#### 1. Maintaining compliant infrastructure

The management of safety, environmental and infrastructure security risk. The environmental, safety and asset security obligations applicable to the network and services Ausgrid provides as a distributor are taken into account to develop Ausgrid's network management strategies.

#### 2. Network performance

Overall network performance is impacted by performance of individual assets, growth in demand, the number of new customer connections required and the extent of any imbalance between overall growth in demand for electricity and available supply.

Ausgrid targets its investment expenditure to ensure network performance and compliance outcomes are achieved efficiently and prudently while meeting all regulatory and other obligations.

The network performance and customer outcomes associated with the planning processes are stipulated in the Design, Reliability and Performance Licence Conditions. However, fault level management is not included. The term fault level relates to how much energy can potentially be released during various fault scenarios - and this parameter varies across the network. Management of fault levels is a critical element of the planning process and can be an investment driver in itself. Ensuring the fault rating of network assets is not exceeded is a significant asset integrity and safety issue, and can drive investment in addition to managing customer outcomes associated with faults.

During 2010/11 Ausgrid issued eight new standards and modified a further 28 existing standards. Major technical disciplines covered in 2010/11 included new electrical and civil standards for the Barangaroo Development, teleprotection signalling, overhead line design and civil standards for major substations.

All network standards are displayed on an intranet platform for general access across Ausgrid and are also available on the Ausgrid website.

**Chapter 2: Customer Installation Safety** – addresses the management of safety in customer premises to the customer's terminal (the point of connection between the customer's electrical installation and the Ausgrid network).

Each year work is undertaken on electrical installations at thousands of customer properties throughout our distribution area. Ausgrid has responsibility for maintaining the distribution network, including the poles and wires required for connection of customer installations. All new and existing electrical work within a customer's electrical installation remains the responsibility of the customer and their installing electrical contractor (contractor).

Customers need to employ licensed electrical contractors for any new or modified electrical work. Accredited Service Providers (ASP) connecting customer installations to our electricity network need to be authorised by Ausgrid.

In preparation of the Customer Installation Safety Plan we have taken into account the NSW Codes of Practice: Service and Installation Rules and Installation Safety Management. There are no departures from these Codes, unless to adopt a higher safety standard. As required we also advise that customers operating electrical installations are subject to the requirements of the Service and Installation Rules of NSW and Ausgrid's local requirements.

There has been a major increase (89%) in the number of notifications of electrical installation work from electrical contractors (CCEW). This is due to applications and connections associated with the NSW Solar Bonus Scheme and its various amendments, particularly the change from 60 cents/kWh to 20 cents/kWh in October 2010 which created an avalanche of applications for connection over a three week period. Ausgrid's policy is to inspect all solar installations, rather than conduct an audit program, due to an increase in inexperienced installers, more complex metering configurations and new technology that feeds into the network. This has resulted in the percentage of total installations inspected rising from 32% in 2008/09, 42% in 2009/10 and 64% in 2010/11.

The number of notifications for Level 2 Service Provider contestable work (NOSW) has increased by 67% from the previous year. This increase is also attributed to the NSW Solar Bonus Scheme and the associated contestable metering work which requires submission of a NOSW.

The major defect rate of 2.92% is significantly lower than last year (5.3%). This lower than expected number can be attributed to the 89% increase in CCEW's submitted. The low number of major defects also relates to no reported shocks from unsafe electrical contractor installation work.

Ausgrid is represented on related Australian Standards committees as well as the Service and Installation Rules of NSW to ensure the focus on customer installation safety is maintained and improved in the review process.

Ausgrid has also become a member of the Clean Energy Council (CEC), Australia's peak solar industry body. They accredit electrical contractors to install solar panels and systems and also undertake compliance audits of completed solar work.

A trial of the *Wirealert* device developed by Aurora Energy and rolled out in Tasmania was completed in 2011. The *Wirealert* device is a supply monitoring device that plugs into a power point and detects potentially dangerous situations arising from a combination of a faulty neutral and earth connections. Ausgrid issued 500 devices to Ausgrid staff and 2500 devices to customers with older higher risk electrical installations. The trial continues as customers report alarms from devices and investigations are carried out.

Ausgrid and Sydney Water are jointly funding the testing of each installation neutral connection impacted by their water main replacement program. Suspected faults are investigated and rectified by Ausgrid.

**Chapter 3: Public Electrical Safety Awareness** – this chapter aims to warn the public of hazards associated with electricity in relation to our network. It is based on an assessment of risks associated with the system and an analysis of any accidents or incidents. Ausgrid's approach to public safety focuses on:

- risk assessment and risk reduction;
- education and communication; and
- hazard response and procedures.

The Public Electrical Safety Awareness Plan outlines Ausgrid's commitment to safety and our responsibilities under the Electricity Supply (Safety and Network Management) Regulation 2008. The plan details Ausgrid's approach to safety and potential hazards associated with the transmission and distribution of electricity, how "at risk" groups are identified and provide precautions to avoid electrical incidents.

Programs are designed to create greater awareness of electrical safety amongst the general public and targeted groups based on an analysis of safety incidents involving Ausgrid's network and relevant data sources.

To communicate our safety message we use a number of communication tools and media to reach the at risk groups including TV, radio and print advertisements, education kits, personal presentations, bill inserts, printed material and the web. A range of safety initiatives and programs undertaken over the past year are outlined in **chapter nine** of this report.

**Chapter 4: Bushfire Risk Management** – the objective of the Bushfire Risk Management chapter is to describe a management framework that when correctly implemented will:

- ensure public safety;
- establish standards for vegetation management near electricity lines (particularly in bushfire prone areas);

- reduce interruptions to supply that are related to vegetation; and
- minimise the possibility of fire ignition by electricity lines and associated equipment.

Ausgrid has an obligation to manage bushfire risks as they relate to our network. We do this by ensuring our assets and our customers' private powerlines are safe and are properly designed, constructed and maintained. This chapter outlines the procedures, standards, codes and guidelines Ausgrid applies to construction, operation and management of our network to achieve this objective. It also provides an overview of Ausgrid's bushfire risk management strategies in relation to key stakeholders including:

- landowners and occupiers;
- local government;
- government agencies; and
- emergency services.

The Bushfire Risk Management Plan also outlines how we inform customers of their obligation to share bushfire prevention responsibilities with us to ensure privately owned overhead powerlines are kept free of vegetation and are inspected, tested and maintained at regular intervals. Details of initiatives undertaken in the last year to improve systems to manage bushfire risk within Ausgrid's network area are outlined in **chapter eight**.

## 2.2 Network Complaints

### 2.2.1 Ausgrid's Compliant Management Process

Ausgrid's complaint processes have been established in line with the principles of Australian Standard 4269:1995. The customer complaints process involves the capture of customer complaints by Ausgrid's Contact Centre or depots. The complaint data is entered into a database, and issued to staff who have the appropriate technical and process skills to investigate and resolve each matter. Following resolution of the matter, completion codes are assigned to ensure complaints are categorised according to the complaint cause, and indicating whether the complaint was substantiated.

Ausgrid has dedicated resources in each region to coordinate and report on quality of supply, reliability and safety complaint investigations, and has committed qualified technical resources to investigate and manage complaints and ensure the high standard of customer complaint resolution is maintained. From reception to resolution, all complaints and disputes are formally recorded to ensure that Ausgrid can continue to deliver a high standard of customer service.

### 2.2 Compliant Performance Data

The number of network complaints received by Ausgrid in 2010/11 totalled 1,420 complaints, which was 27% more than the number received in 2009/10. For the same period, the number of network customers increased by 14,353. This resulted in the complaint rate of 0.88 complaints per 1,000 network distribution customers.

Table 2.1 Complaint Performance Data	Previous Years				2010/11
Year	2006/07	2007/08	2008/09	2009/10	2010/11
Complaints Total	1,554	1,669	1,409	1,121	1,420
Complaints per 1,000 Distribution Customers	0.99	1.06	0.89	0.70	0.88
Complaints regarding Vegetation Management	142	165	126	118	242

There were 177 valid voltage, current, quality of supply, reliability and safety complaint investigations completed in 2010/11.

Table 2.2 Network Complaint Investigations Completed 2010/11	Number	Number Valid*
Voltage	282	61
Current	0	0
Other Quality	58	25
Reliability	262	90
Safety	1	1

\* A complaint is valid where non-compliance with published service and network standards occurs.

## 2.3 Customer Service Standards Reporting

Ausgrid is committed to providing the best possible service to our customers across our network area. That is why we are investing significant capital across our network to keep pace with the growing demand for power and to provide a safe and reliable electricity supply.

Ausgrid does everything it can to minimise interruptions to customers' power supply. Across the network we maintain a reliable supply to customers approximately 99.98 per cent of the time. However, from time to time in a large and complex network there are instances where customers are inconvenienced by too many power cuts over the course of a year, or by interruptions that last too long.

In accordance with the Customer Service Standards incorporated within the Design, Reliability and Performance licence conditions, metropolitan customers may make a claim if they experience an interruption that is greater than 12 hours in duration, or more than four interruptions, within a financial year, each lasting longer than four hours<sup>1</sup>.

Ausgrid received 1887 Customer Service Standards claims in the 2010/11 financial year and there were 1428 eligible claims. The increase from 2009/10 was due to an incident that occurred in Enfield zone on 2 February 2011. Customers supplied from the Enfield zone at the time experienced interruptions of more than twelve hours in duration. 452 claims were not valid due to failure to meet the frequency and duration standards. 7 claims received were invalid (as they did not contain sufficient information and were returned to the claimant) and have not been included in the table below.

	Payments Given Based on Interruption Duration (Total Number)	Claims Not Paid Based on Interruption Duration (Total Number)	Payments Given Based on Interruption Frequency (Total Number)	Claims Not Paid Based on Interruption Frequency (Total Number)
Metropolitan	1418	318	4	129
Non-Metropolitan	6	5	0	0

## 3. Network Planning

### 3.1 Overview

Ausgrid carries out planning at the strategic and project level, driven by prudent, strategic decisions which consider the capital investment required and the delivery of individual projects.

Ausgrid's network planning approach is outlined in the Network Management Plan and is consistent with the principles of the NSW Government's Total Asset Management system.

Drivers of network investment include network performance, customer connections and modern infrastructure standards.

Ausgrid is required to comply with service standards in the Design, Reliability and Performance licence conditions imposed by the Minister for Energy. The licence conditions facilitate the delivery of a safe and reliable supply of electricity.

Ausgrid's Electricity Network Operation Standards detail objectives for maintaining quality electricity supply.

Capital investment requirements in the subtransmission network are forecast in line with investment drivers across 25 network areas. Ausgrid also has three transmission plans: Sydney Metropolitan, Central Coast and Lower Hunter, which focus on the transmission network linking TransGrid's bulk supply points to subtransmission substations.

The spatial demand forecast is a critical process which supports planning, development of the capital program and the five yearly regulatory submission. Following two independent audits and a major review, changes to the forecasting process have been made. The most significant change has been the implementation of a new IT forecasting application which will provide greater efficiency and accuracy for future forecasts.

<sup>1</sup> Non metropolitan customers may make a claim for interruptions greater than 18 hours in duration or more than four interruptions, within a financial year, each lasting longer than five hours.

## 3.2 Design Planning Criteria Compliance Reporting

The design planning criteria contained within the licence conditions set input standards to be used in planning the network, requirements for load forecasting and contingency planning methodologies intended to achieve operational outcomes.

The design planning criteria applicable to Ausgrid's network are set out in below. The implications of the design planning criteria contained in the licence conditions, and the accompanying notes, are explained in detail in Ausgrid's Network Management Plan.

Design Planning Criteria				
Network Element	Load Type	Forecast Demand or Expected Demand	Security Standard	Customer Interruption Time
Subtransmission Line	CBD	Any	N-2 <sup>6</sup>	Nil for 1 <sup>st</sup> credible contingency < 1hr for 2 <sup>nd</sup> credible contingency
	Urban & Non-Urban	≥ 10 MVA	N-1 <sup>1</sup>	< 1 minute
	Non-Urban	< 10 MVA	N <sup>2</sup>	Best practice repair time
Subtransmission Substation	CBD <sup>1,2</sup>	Any	N-2 <sup>6</sup>	Nil for 1 <sup>st</sup> credible contingency < 1hr for 2 <sup>nd</sup> credible contingency
	Urban & Non-Urban	Any	N-1	< 1 minute
Zone Substation	CBD <sup>1,2</sup>	Any	N-2 <sup>6</sup>	Nil for 1 <sup>st</sup> credible contingency < 1hr for 2 <sup>nd</sup> credible contingency
	Urban & Non-Urban	≥ 10 MVA	N-1 <sup>1</sup>	< 1 minute
	Urban & Non-Urban	< 10 MVA	N <sup>2</sup>	Best practice repair time
Distribution Feeder	CBD	Any	N-1 <sup>3</sup>	Nil
	Urban	Any	N-1 <sup>4</sup>	< 4 Hours <sup>5</sup>
	Non-Urban	Any	N	Best practice repair time
Distribution Substation	CBD <sup>1</sup>	Any	N-1 <sup>3</sup>	Nil
	Urban & Non-Urban	Any	N <sup>7</sup>	Best practice repair time

1. For a subtransmission line – overhead and zone substation:
  - a. under N-1 conditions, the forecast demand is not to exceed the thermal capacity for more than 1% of the time ie a total aggregate time of 88 hours per annum, up to a maximum of 20% above the thermal capacity under N-1 conditions.
  - b. under N conditions, a further criterion is that the thermal capacity is required to meet at least 115% of forecast demand.

For a subtransmission line – underground, any overhead section may be designed as if it was a subtransmission line – overhead, providing the forecast demand does not exceed the thermal capacity of the underground section at any time under N-1 conditions.

2. Under N conditions, thermal capacity is to be provided for greater than 115% of forecast demand.
3. The actual security standard is an enhanced N-1. For a second coincident credible contingency on the CBD triplex system, restricted essential load can still be supplied.
4. By 30 June 2014, expected demand is to be no more than 80% of feeder thermal capacity (under system normal operating conditions) with switchable interconnection to adjacent feeders enabling restoration for an unplanned network element failure. By 30 June 2019, expected demand is to be no more than 75% of feeder thermal capacity. In order to achieve compliance, feeder reinforcement projects may need to be undertaken over more than one regulatory period. In those cases where a number of feeders form an interrelated system (such as a meshed network), the limits apply to the average loading of the feeders within one system.
5. The timeframe is expected only, and is based on the need to carry out the isolation and restoration switching referred to in note 4. This standard does not apply to interim / staged supplies, i.e. prior to completion of the entire development or to excluded interruptions outside the control of the licence holder.
6. In the CBD area, N-2 equivalent is achieved by the network being normally configured on the basis of N-1 with no interruption of supply when any one line or item of electrical apparatus within a substation is out of service. The licence holder must plan the CBD network to cater for two credible contingencies involving the loss of multiple lines or items of electrical apparatus within a substation, by being able to restore supply within 1 hour. Restoration may be via alternative arrangements (eg 11kV interconnections).
7. Urban distribution substations shared, or available to be shared, by multiple customers are generally expected to have some level of redundancy for an unplanned contingency (e.g. via low voltage manual interconnection to adjacent substations enabling at least partial restoration).

### **3.2.1 Design Planning Criteria Reporting**

Ausgrid has a suite of investment plans, covering each of the transmission, subtransmission, distribution and low voltage areas of the network to ensure that we design our network to accord with the design planning criteria within the timeframes specified in conditions 14.1 and 14.2 of the licence conditions.

#### **Transmission/Subtransmission Planning**

To ensure that all drivers are considered in an holistic manner, Ausgrid has developed a set of area plans that encompass all strategic network investment drivers within the transmission and subtransmission levels of the network. The area plans contain all strategic growth, reliability, customer connection and replacement driver investments within each area.

Ausgrid produces a five year network management plan and Annual Electricity System Development Review (AESDR) on an annual basis.

The network management plan outlines our planned investments by region, and the AESDR shows emerging constraints for each subtransmission and zone substation. Each emerging constraint is addressed by an indicative solution, and makes up Ausgrid's plan to accord with the design planning criteria.

#### **Distribution Network Planning**

To meet the distribution Design Planning Criteria within the required timeframe, Ausgrid has adopted the following, multi-faceted strategy:

- Where it can be demonstrated to be cost effective, zone and subtransmission level projects initiated by strategic investment drivers, including demand constraints and asset condition (such as load transfers between zone substations, switchgear replacement, zone transformer commissioning etc) are optimised so that they also mitigate or address any latent distribution constraints in the affected portions of the network.
- Prioritisation of projects is based on considerations such as scope, delivery time, cost, load at risk, and likelihood of the risk.
- Development of proactive feeder non-compliance forecasting, reporting, and prioritisation regime.
- Significant ramping up of the distribution network capital program to a level necessary for licence compliance by 2014.
- A cross-divisional efficiency review of the end-to-end capital project delivery process (from planning conception to project commissioning).

#### **Distribution Substation Planning**

Ausgrid's licence conditions for distribution substations require N-1 performance (with no customer interruptions in the CBD) and N performance (with best practice repair time) elsewhere in the network. The standard of service provided at

customer substations is subject to customer requirements. Ausgrid has set utilisation targets for distribution substations which maintain loading within the cyclic rating. These targets correspond with the requirements of the licence conditions.

Utilisation at some distribution centres is presently above the levels required for licence compliance. Ausgrid has a plan which has identified the resourcing required in the period to 2014 to bring the current network utilisation to the required levels and to account for organic growth in demand over the period.

### Progress Against Our Plan

During 2010/11 Ausgrid invested around \$1.58 billion on capital projects. Whilst Ausgrid has made progress during 2010/11 against our plan to comply with the licence conditions we have a significant challenge ahead. Ausgrid is forecasting a large program of investments for the 2009-14 period which is driven by the need to systematically replace a large number of ageing network assets as well as the requirement to meet the mandatory licence conditions.

Ausgrid's plan is to meet the Design Planning Criteria by 30 June 2014. The table below outlines our progress during the year towards our plan.

Estimated Percentage Currently Not Meeting the Requirements of Schedule 1	
Network Element	June 2011
Subtransmission- Feeders	5.1%
Subtransmission – Substations	4.9%
<b>Subtransmission – Total</b>	<b>5.1%</b>
Distribution Feeders – CBD	1.2%
Distribution Feeders – Urban	7.6%
Distribution Feeders – Non urban	3.4%
<b>Distribution Feeders – Total</b>	<b>6.6%</b>
Distribution Substations – CBD	0.5%
Distribution Substations – Urban and Non Urban	0.9%
<b>Distribution Substations – Total</b>	<b>0.9%</b>

### Network Elements Not Complying with the Design Planning Criteria on 1 July 2011

On 1 July 2010, Ausgrid was required to comply with the Design Planning Criteria for any new network element where planning for that network element commenced after 1 December 2007. Existing elements need to be compliant with the design planning criteria by 1 July 2014.

Whilst all existing network elements are forecast to meet the Design Planning Criteria by 1 July 2014 as required, there are some network elements that currently do not meet the requirements of schedule 1. These network elements and the proposed indicative network solutions will be detailed in the 2010/11 Annual Electricity System Development Review (AESDR) due to be published on the Ausgrid website by end 2011.

Table 3.1 Sub-Transmission Lines and Substations and Zone Substations Not Complying With the Design Planning Criteria on 1 July 2011

Element including Location, Customer Numbers, Element Length/Capacity	Description of Non-Compliance and Reason	Proposed Remedial Actions and Timetable
Refer Appendix F	Refer Appendix F	Refer Appendix F

Table 3.2 Distribution Feeder Summary Report by Class of Network Elements Not Complying with the Design Planning Criteria on 1 July 2011

CBD			
Total Number of Feeders	Number of Feeders Without N-1 Capability (1 Minute)	Description and Reason for Non-Compliance	Proposed Remedial Actions and Timetable
168	2	Growth in peak demand on this feeder network has resulted in peak loads being non firm	5th October 2011 - Due for completion
URBAN			
Total Number of Feeders	Number of Feeders Without N -1 Capability	Description and Reason for Non-Compliance	Proposed Remedial Actions and Timetable
1739	133	General load growth. *A full review of all feeders is expected by June 2013. At which time all feeders which do not meet N and N-1 capability will be identified.	Ausgrid is planning to meet the design planning criteria by June 2014.
NON-URBAN			
Total Number of Feeders	Number of Feeders Without N Capability	Description and Reason for Non-Compliance	Proposed Remedial Actions and Timetable
265	9	General load growth. *A full review of all feeders is expected by June 2013. At which time all feeders which do not meet N and N-1 capability will be identified.	Ausgrid is planning to meet the design planning criteria by June 2014.

Two methods for classifying distribution: Feeders are described in the licence conditions. Ausgrid generally classifies its distribution feeders according to a classification of 'load type' (method 1).

**Table 3.3 Distribution Substation Summary Report by Class of Network Elements Not Complying with the Design Planning Criteria on 1 July 2011**

<b>CBD</b>			
<b>Total Number of Substations</b>	<b>Number of Substations Without N-1 Capability (1 Minute)</b>	<b>Description and Reason for Non-Compliance</b>	<b>Proposed Remedial Actions and Timetable</b>
435	2	Substations loaded above 100% of firm rating	Remove overload by uprating existing substations or transferring load to adjacent substations. Due for completion July 2014
<b>URBAN and NON-URBAN</b>			
<b>Total Number of Substations</b>	<b>Number of Substations Without N Capability</b>	<b>Description and Reason for Non-Compliance</b>	<b>Proposed Remedial Actions and Timetable</b>
<b>30136</b>	<b>276</b>	Substations loaded above 100% of firm rating	Remove overload by uprating existing substations, transferring load to adjacent substations, installing new low voltage distributors or new substations. Due for completion July 2014

### 3.3 Demand Management

Emerging constraints on the supply system are identified through the planning process, and published in the Annual Electricity System Development Review (AESDR) on the Ausgrid website.

Each constraint with a network augmentation solution cost of >\$1m is assessed to determine whether it is reasonable to expect that demand management (DM) might prove to be cost effective.

The first step in the demand management process is a DM Screening Test. This report determines whether it would be reasonable to expect that it would be cost effective to avoid or postpone the expansion of the network by implementing DM strategies. If the conclusion is positive, a formal DM Investigation follows.

Based on the DM requirements identified in the screening test, the DM Investigation identifies possible DM options that might exist in the study area based on existing knowledge, field visits, public consultation with interested parties, and contact with specific customers. Any feasible DM options are considered for development alongside network augmentation options.

If a feasible DM option is determined to be the most economical solution, it is implemented with clear deliverables in terms of demand reduction, timing and cost. A more detailed summary of this DM process is provided on Ausgrid's website.

Table 3.4 Demand Management Projects Implemented During 2010/11

	Description of Demand Management Project Implemented	Peak Demand Reduction (kVA)	PV of Costs of Demand Management Project	PV of Total of Capital Expenditure Deferralment plus Op Ex Savings
<b>Individual large projects</b>				
Greenacre Park Area Stage 2 - Power Factor Correction	A power factor correction program facilitating the installation of equipment at up to 38 large customers' premises where power factor is low. Customers are offered discounted prices through bulk buying and project facilitation. The target capacity of installations is 3.5MVar resulting in peak demand reduction of 1.3 MVA. Demand reduction capability will persist for duration of deferral (1 year).	3,500 kVAr	\$114,536	\$2,565,000
North West Pennant Hills generators	0.4 MVA to 1MVA of diesel generation will be installed in North West Pennant Hills for summer 2010/11 through to summer 2014/15. It is capable of operating in parallel with the network and can be called at any time from the Network control room. Demand reduction capability will persist for duration of deferral (5 years).	1,000 kVA	\$1,252,525	\$1,600,000
Network capacitors at Peakhurst STS	Installation of reactive support within the network	80,000 kVar	\$3,389,924	To reduce load at risk and ensure power factor complies with National Electricity Rules requirements.
Sub-totals		1,000kVA + 83,500kVar	\$4,756,985	\$4,165,000
<b>Consolidated projects</b>				
N/A	N/A	N/A	N/A	N/A
<b>Totals</b>		1,000kVA + 83,500kVar	\$4,756,985	\$4,165,000

Table 3.5 Demand Management Investigations in 2010/11 Found Non-Viable		
	Description of Potential Demand Management Project Investigated and Reason for Non-viability	PV of Costs of Investigations
Maitland 33/11kV Zone Substation	A constraint was identified for investigation. However the subsequent investigation concluded that DM was not a viable option to defer the supply side investment due to asset replacement requirements.	\$48,705
St Ives Zone Substation Upgrade	A constraint was identified for investigation. However the subsequent investigation concluded that DM was not a viable option to defer the supply side investment due to the combination of a high demand reduction requirement, moderate deferral value, and that the target load area was predominantly residential (where it is generally more expensive to achieve demand reductions compared to commercial/industrial areas).	\$52,390
Epping 11kV Zone Development	A constraint was identified for investigation. The DM investigation concluded that DM was likely to be a cost effective in this case. Development of a DM project was initiated which included embedded generation and thermal storage options, however this was cancelled when the relevant customer(s) withdrew their interest from the program.	\$67,824
Morisset Zone 11kV Development	A constraint was identified for investigation. However the subsequent investigation concluded that DM was not a viable option to defer the supply side investment due to the combination of a high demand reduction requirement, and low to moderate deferral value.	\$495
Breakfast Point Development	A constraint was identified for investigation. However the subsequent investigation concluded that DM was not a viable option to defer the supply side investment due to the combination of a high demand reduction requirement, moderate deferral value, and that the target load area was predominantly residential (where it is generally more expensive to achieve demand reductions compared to commercial/industrial areas).	\$1,225
Zetland South Zone Development	A constraint was identified for investigation. However the subsequent investigation concluded that DM was not a viable option to defer the supply side investment due to the combination of a high demand reduction requirement, and low to moderate deferral value.	\$1,537
Balgowlah North Zone Development	A constraint was identified for investigation. However the subsequent investigation concluded that DM was not a viable option to defer the supply side investment due to the combination of a high demand reduction requirement, low to moderate deferral value, and that the target load area was predominantly residential (where it is generally more expensive to achieve demand reductions compared to commercial/industrial areas).	\$2,793
Lidcombe to Flemington 11kV Load Transfer	A constraint was identified for investigation. However the subsequent investigation concluded that DM was not a viable option to defer the supply side investment due to the combination of a high demand reduction requirement, and low deferral value.	\$1,611
SOPA New Zone Substation	A constraint was identified for investigation. However the subsequent investigation concluded that DM was not a viable option to defer the supply side investment due to the combination of a high demand reduction requirement, and moderate deferral value.	\$35,711
Medowie Zone Substation	A constraint was identified for investigation. However the subsequent investigation concluded that DM was not a viable option to defer the supply side investment due to the combination of a high demand reduction requirement, moderate deferral value, and that the target load area was predominantly residential (where it is generally more expensive to achieve demand reductions compared to commercial/industrial areas).	\$14,997

Campsie & Enfield Zones Load Area	A constraint was identified for investigation. However the subsequent investigation concluded that DM was not a viable option to defer the supply side investment due to the combination of a high demand reduction requirement, and low to moderate deferral value.	\$2,939
Oxford St Low Voltage Development	A constraint was identified for investigation. However the subsequent investigation concluded that DM was not a viable option to defer the supply side investment due the combination of a low deferral value compared to the cost savings achieved by synchronising the cabling works with other local council street improvement works.	\$2,991
Inner Metropolitan Reactive Support	A constraint was identified for investigation. However the subsequent investigation concluded that DM was not a viable option to defer the supply side investment due to the combination of a high demand reduction requirement, and low deferral value.	\$3,423
East Maitland Zone Substation	A constraint was identified for investigation. However the subsequent investigation concluded that DM was not a viable option to defer the supply side investment due to the combination of a high demand reduction requirement, and moderate deferral value.	\$66,835
Avoca Zone 11kV Development	A constraint was identified for investigation. However the subsequent investigation concluded that DM was not a viable option to defer the supply side investment due to the combination of a high demand reduction requirement, and low deferral value.	\$2,626
Turrumurra North Zone Development	A constraint was identified for investigation. However the subsequent investigation concluded that, on balance, DM was not a viable option to defer the supply side investment due to the combination of a low to moderate demand reduction requirement, low to moderate deferral value, and that the target load area was predominantly residential (where it is generally more expensive to achieve demand reductions compared to commercial/industrial areas).	\$861
Peats Ridge Pa 3 & 4	A constraint was identified for investigation. However the subsequent investigation concluded that DM was not a viable option to defer the supply side investment due to the combination of a very high demand reduction requirement, and moderate to high deferral value.	\$29,058
Charmhaven Zone development - Stage 1	A constraint was identified for investigation. However the subsequent investigation concluded that, on balance, DM was not a viable option to defer the supply side investment due to the combination of a high demand reduction requirement, low to moderate deferral value, and that the target load area was predominantly residential (where it is generally more expensive to achieve demand reductions compared to commercial/industrial areas).	\$9,486

## 4. Asset Management

### 4.1 Overview

Ausgrid's philosophy is that an integrated asset management system forms the backbone of an effective service delivery program. We believe that through the integration of all facets of asset management, including design, procurement, maintenance activities, renewals/replacements, capital investment, condition monitoring and continuous improvement, Ausgrid will deliver our business and strategic objectives. These objectives are established and documented in our Network Maintenance Plan. The service delivery program is essential to preserve the engineering integrity of assets and their continued fitness for use within the electrical system. This will enable Ausgrid to meet its commercial obligations and statutory responsibilities under the Electricity Safety Act and Occupational Health and Safety Regulation.

The asset management strategies, models and processes adopted by Ausgrid are consistent with the elements of a total asset management system as identified in the NSW Government's Total Asset Management (TAM) Manual.

## 4.2 Technical Service Standards

Ausgrid published its latest version of Electricity Network Operation Standards (ENOS) in June 2009. The document sets out standards of service customers can expect from Ausgrid's network.

Electricity delivered by Ausgrid's network has particular characteristics including some interruptions to supply caused when powerlines are damaged by storms, bushfires and accidents. Essentially, Ausgrid's objective is to achieve the best possible overall reliability of our electricity network, given the condition and utilisation of network assets and the funding available to maintain and augment the electricity network. In addition, Ausgrid makes all reasonable and practicable efforts to ensure that in any financial year, it meets the targets set by the NSW Department of Trade and Investment, Regional Infrastructure and Services, in respect to reliability standards and individual feeder standards.

Technical information relating to service standards of Ausgrid's network and supply commitments can be found on the Ausgrid website [www.ausgrid.com.au](http://www.ausgrid.com.au) or through the Ausgrid Contact centre on 13 15 35.

## 4.3 Quality of Supply

### 4.3.1 Overview

The quality of electricity provided to customers is not always suitable for use by all customer equipment. Ausgrid recommends customers use the ENA Customer Guide to Electricity Supply to minimise any potential problems.

Ausgrid uses the results of the University of Wollongong Long Term National Power Quality Survey (LTNPQS) to monitor quality of supply issues and trends and is introducing a baseline low voltage steady state voltage survey to better monitor its network performance.

Ausgrid is working to improve its assessments of new customer connections to ensure levels of harmonics and flicker levels remain satisfactory. Ausgrid is slightly reducing the average low voltage steady state voltage over time to maintain alignment between the network voltage range and customer equipment utilisation voltages. This is because of the ongoing replacement of legacy 240V range equipment with 230V equipment.

### 4.3.2 Performance Data

Ausgrid's power quality monitoring survey data is summarised and analysed in four key Power Quality (PQ) disturbance types:

- Steady state voltage;
- Voltage unbalance;
- Voltage harmonics;
- Voltage sags.

A very large quantity of data is gathered during the survey process. It takes several months for the University of Wollongong to analyse and produce a report after each survey period (based on the financial year) has finished. For this reason the 2010 report was based on the data surveyed during the 2008/09 financial year; similarly this year's report is based on the PQ data survey during 2009/10 financial year. Therefore, the actions that have been taken to address the issues on exceeding targets for 2011 report will only be reflected in next year's report.

For the financial year 2009/10, Ausgrid was able to analyse the PQ data for all of the 37 sites that were monitored, i.e. 25 LV sites and 12 MV sites. Due to retail contestability, some sites were lost to different retailers, so that replacement sites were chosen within the Ausgrid franchise area. The LTNPQS report analyses PQ performance for steady state voltage, voltage unbalance and harmonics (there is no standard defining sag limits at present).

Based on targets stated in LTNPQS report, the majority of sites surveyed met all targets. One LV site was found to have exceeded the upper limit for 95<sup>th</sup> percentile values<sup>2</sup> in relation to the steady state voltage magnitude.

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<sup>2</sup> Voltage 95<sup>th</sup> percentile ( $V_{95\%}$ ) – the 95<sup>th</sup> percentile voltage provides an indication of the light-load voltage at a site.  $V_{95\%}$  is expressed in per unit with nominal voltage (240V) as the base.

The voltage unbalance assessment is based on 95<sup>th</sup> percentile and the limit for 10 minute readings of LV voltage unbalance (defined in Table S5.1a.1 of the National Electricity Rules) is 2.5% for LV and 2% for MV. One LV site was found to exceed the voltage unbalance limit whereas all MV sites surveyed met the target.

The assessment of Total Harmonic Distortion (THD) is based on 95<sup>th</sup> percentile and the limit for LV and MV is specified in Table 1 of AS/NZS61000.3.6:2001 which is 8%. All LV and MV sites surveyed met the target.

Ausgrid provides the percentage of sites exceeding PQ limits information as an indicative assessment only of how Ausgrid network is performing in relation to steady state voltage, harmonics and unbalance, compared to previous years.

The following table outlines the trend of percent of sites exceeding limits from 2008/09 to 2009/10. This year, one site has exceeded the limit in relation to the steady state voltage and also one LV site was found to exceed the unbalance limit. The exceeded site has marginally exceeded the 240+6% (254.4V) at 95<sup>th</sup> percentile steady state voltage. The maximum LV steady state voltage at 95<sup>th</sup> percentile is 255.6 Volts which is about 0.46% above the limit.

Percentage of Sites exceeding limits					
Indices		LV Sites		MV sites	
		2008/09	2009/10	2008/09	2009/10
Voltage	V High (V <sub>95%</sub> )	15%	4%	0%	0%
	V Low (V <sub>5%</sub> )	0%	0%	0%	0%
Unbalance	VUF	4%	4%	0%	0%
Harmonics	THD	0%	0%	0%	0%

Note: As only as small number of sites are analysed and the actual sites surveyed may vary from year to year, trend data should be treated as indicative only.

The LTNPQS result for steady state voltage ranges and LV voltage unbalance indicates that action to generally reduce voltage levels is required. This will be undertaken via Ausgrid's Power Quality Management Plan with migration from a 240V nominal range (average voltage around 250V) to a 230V nominal range (average voltage around 240V). Implementation actions include adjustment of line drop compensation settings, optimisation of 11kV float voltages, distribution substation tap changes and an annual baseline steady state voltage survey.

## 4.4 Distribution Reliability

Distribution network indices and associated methodologies are defined in Attachment A.

### 4.4.1 Overview

This report has been prepared in accordance with the 'Design, Reliability and Performance Licence Conditions' imposed by the Minister for Energy and Utilities on 1 December 2007 and the standards issued by the 'Steering Committee on National Regulatory Reporting Requirements' (SCNRRR).

Two related indices are applied when reporting reliability. The first, SAIDI, is commonly referred to as the "Reliability Index" and represents the average number of customer minutes lost by all network customers. SAIFI represents the average number of interruptions for all customers.

The following notes relate to the reporting system issues outlined in Note 1 Attachment A to this report.

Ausgrid had implemented a new Outage Management System (OMS) in July 2007 linked to the Geographic Information System (GIS) to mitigate the accuracy and integrity issues highlighted in the Review of NSW Distribution Network Service Providers Measurement and Reporting of Network Reliability prepared for IPART by PB Associates.

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Voltage 5<sup>th</sup> percentile (V<sub>5%</sub>) – the 5<sup>th</sup> percentile voltage provides an indication of the heavy-load voltage at a site. V<sub>5%</sub> is expressed in per unit with nominal voltage (240V) as the base.

The new OMS utilises the links between customers and assets in the GIS and records outages linked to customer calls and SCADA indications. The new OMS mitigates most of the issues noted in the Summary section of the PB Associates report.

The classification of Ausgrid’s approximately 2000 high voltage distribution feeders into the categories CBD, Urban, Short Rural and Long Rural is reviewed at the start of each annual reporting period. To cater for augmentation work throughout the year new feeders are classified at the time of commissioning.

Reliability reporting uses the IEEE methodology for defining Major Event Days as outlined in the “Design, Reliability and Performance Licence Conditions”.

There are three instances where Ausgrid departs from the Definitions detailed in Attachment A to this report – departures in relation to Notes 2 and 3 of Table A.1 Reliability Measures, and in regard to the calculation for the Major Event Day Threshold (Tmed).

Note 2 – Ausgrid measures and records customers affected and the customer base on a daily basis. Reliability performance indices are calculated on a daily basis rather than using the average of the number of customers at the beginning and the end of the reporting period. The daily calculation method provides a more representative customer performance at the time of the event. This had not been possible until the new OMS system was introduced.

Note 3 – Ausgrid does not exclude inactive accounts. There are natural time delays in updating customer account details into the real-time OMS, particularly where Ausgrid relies on information from other electricity Retailers. Ausgrid considers the recording of reliability performance for all active premises (whether the premise is vacant or not) to be a practical administrative outcome.

This action has little effect on reported reliability performance. The inclusion of vacant premises increases both the customers affected (numerator) and the customer base (denominator) of the Indices calculations.

In regard to the calculation for the Major Event Day Threshold (Tmed), the Design, Reliability and Performance Licence Conditions review working group had agreed, in March 2010, that the Tmed calculation should be consistent with the Australian Energy Regulator (AER) Tmed calculation method. The Design, Reliability and Performance Licence Conditions require (Schedule 6) that Planned Outages be included in the daily SAIDI dataset for calculation of the Tmed value. The AER requires (STPIS definitions November 2009) that Planned Outages be excluded from the daily SAIDI dataset for calculation of the Tmed value.

This agreed change to the Tmed calculation has not yet been amended in the Design, Reliability and Performance Licence Conditions document. However, Ausgrid has applied this change to the 2010/11 reliability performance reporting to ensure consistency with the AER reliability performance reporting definitions, as agreed with the Minister’s Office.

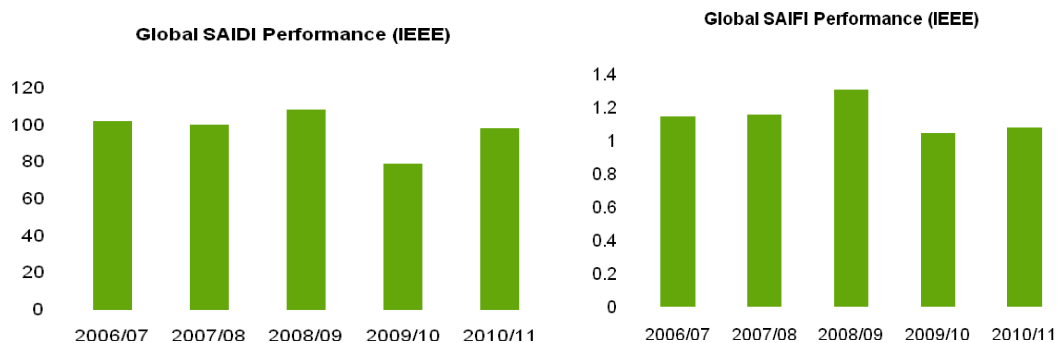
This action impacts the number of Major Event Days that may be identified for exclusion of the Normalised reliability performance in any given year.

The performance for each feeder category and the organisational performance overall are detailed in section 4.4.2. Organisational trends are detailed in section 4.4.3 and feeder category performance trends are detailed in section 4.4.4, including commentary on excluded events in section 4.4.5. Finally, the Individual Feeder performance for the year is detailed in section 4.4.6.

#### 4.4.2 Organisational Performance (Normalised Trend)

Year	Previous Years				Current Year
	2006/07	2007/08	2008/09	2009/10	2010/11
SAIDI	102	100.3	108.5	79	98.59
SAIFI	1.15	1.16	1.31	1.05	1.08

Table 4.1 data representing SAIDI and SAIFI is also shown graphically below.



2010/11 reliability performance has returned, as expected, to more normal variations around the longer term underlying reliability performance trends in comparison with the exceptionally good performance in 2009/10. However, the record heat wave in early February 2011 caused a Major Event Day on 2 February 2011. That 7 day period contributed an additional 7.8 Normalised SAIDI more than the equivalent February period in 2009/10 (after Major Event Day excluded). The heat wave mainly impacted Urban SAIDI as 86% of Ausgrid's customers are in the Urban feeder category.

#### 4.4.3 Organisational Detailed Performance 2010/11

Reliability data sets for SAIDI and SAIFI are reported for the whole organisation and feeder categories in Table 4.2.

Table 4.2 Organisational Detailed Performance 2010/11						
Sustained Interruption Data Sets		Whole Organisation and Feeder Category				
Category		ORG*	CBD	Urban	Short Rural	Long Rural
<b>Customer Numbers<sup>3</sup></b>		1,619,804	30,472	1,395,434	191,346	2,552
<b>SAIDI</b>	Overall <sup>4</sup>	134.38	11.21	107.19	343.26	891.10
	Planned	19.44	6.10	8.84	93.61	414.69
	Unplanned <sup>5</sup>	106.83	5.11	90.75	235.55	476.41
	Normalised <sup>6</sup>	98.59	5.11	82.62	225.10	467.57
<b>SAIFI</b>	Overall	1.21	0.08	1.05	2.44	5.49
	Planned	0.05	0.02	0.02	0.21	1.13
	Unplanned	1.12	0.06	1.00	2.14	4.36
	Normalised	1.08	0.06	0.97	2.06	4.31

\*ORG refers to average performance of the organisation overall.

<sup>3</sup> Customer numbers as at the end of June 2010 for the purposes of reliability indices only. Refer to Table 1.1 for the total of customers served.

<sup>4</sup> Overall performance represents the total performance experienced by our customers, irrespective of cause or origin of the fault.

<sup>5</sup> Planned and Unplanned performance is the Distribution Network Interruptions (DNI) that have all the excluded interruptions removed, except for Major Event days, as defined in attachment A, in accordance with the 'Steering Committee on National Regulatory Reporting Requirements' (SCNRRR) standards i.e. excludes Transgrid and load shedding events, Emergency Services instructed events, momentary interruptions and interruptions caused by a customer installation failure.

<sup>6</sup> Normalised Distribution Network (NDN) performance is the DNI performance with the Major Event Days excluded, and represents the events that Ausgrid is expected to manage and are responsible for. The Major Event Days that have been excluded are defined in section 4.4.5.

#### 4.4.4 Reliability Report against Standards

All feeder category performances were compliant against the Reliability Standards for 2010/11, except for Urban SAIDI.

The 7-day heatwave period (31st Jan – 6th Feb) directly contributed an additional 6.4 Urban SAIDI for 2010/11 (above the 5yr average Urban SAIDI for a February month.)

If this record 7-day heatwave had not occurred, the June 2011 Urban SAIDI result would have been approximately 76.7 SAIDI (ie 83.1 - 6.4 SAIDI) and within Urban Reliability Standards of 80 SAIDI for 2010/11.

Table 4.3 CBD Feeder Performance (Normalised) Trend						
		Previous Years				Current Year
Year		2006/07	2007/08	2008/09	2009/10	2010/11
SAIDI	Actual	13.04	8.07	41.71	38.14	5.11
	Target	57	54	51	48	45
SAIFI	Actual	0.17	0.04	0.55	0.11	0.06
	Target	0.34	0.33	0.32	0.31	0.3

Table 4.4 Urban Feeder Performance (Normalised) Trend						
		Previous Years				Current Year
Year		2006/07	2007/08	2008/09	2009/10	2010/11
SAIDI	Actual	77.56	74.83	93.55	66.7	82.62
	Target	90	88	86	84	80
SAIFI	Actual	0.96	1.04	1.15	0.95	0.97
	Target	1.28	1.26	1.24	1.22	1.2

Table 4.5 Rural Short Feeder Performance (Normalised) Trend						
		Previous Years				Current Year
Year		2006/07	2007/08	2008/09	2009/10	2010/11
SAIDI	Actual	290	219.26	217.25	179.08	225.10
	Target	380	360	340	320	300
SAIFI	Actual	2.76	2.16	2.44	2.05	2.06
	Target	4.2	3.9	3.7	3.4	3.2

Table 4.6 Rural Long-Feed Performance (Normalised) Trend						
		Previous Years				Current Year
Year		2006/07	2007/08	2008/09	2009/10	2010/11
SAIDI	Actual	1,093.47	543.27	608.69	443.63	467.57
	Target	860	820	780	740	700
SAIFI	Actual	5.64	4.08	4.34	3.52	4.31
	Target	8	7.5	7	6.5	6

#### Excluded Events

Excluded interruptions for the reporting period have been listed in Table 4.7 with a description of the basis on which the event met the exclusion criteria. The criteria for excluding events are outlined in Attachment A of this report.

## Major Event Day TMED

A major event day under the Beta Method is one in which the daily total system (i.e. not on a feeder type basis) SAIDI value ("daily SAIDI value") exceeds a threshold value, TMED. The 2009/10 value of TMED used in preparing Table 4.7 was 3.31 SAIDI per day.

Date of Event	Description of Event	Number of Customers Interrupted	Maximum Duration of Interruption (minutes)	Effect of Event on SAIDI Figure (minutes)	Basis for Exclusion
3 August 2010	Major Event Day  (The Major Event Day was primarily due to strong wind storm across Ausgrid)	30,543  (29,552 customers interrupted due to the wind storm event)	888 minutes  (The wind storm caused event max duration only)	4.31 SAIDI  (4.09 SAIDI due to the wind storm oh crapevent)	<b>Exceeds Tmed 3.31</b>
2 February 2011	Major Event Day  (The Major Event Day was primarily due to record heat wave across Ausgrid)	28,727  (23,335 customers interrupted due to heat wave event on this Major Event Day)	1680 minutes  (15 customers restored after distribution substation restored)	3.94 SAIDI  (3.14 SAIDI due to the heat wave event on this Major Event day)	<b>Exceeds Tmed 3.31</b>

Note: Maximum Duration means the time until the last high voltage feeder section is restored (not the last customer, which may involve a service failure which has not been reported).

### 4.4.5 Performance Against Individual Feeder Standards

The performance objectives for organisational average performances for each feeder category are not sufficient to identify when customers on a particular feeder experience unsatisfactory reliability performance. For this reason, SAIDI and SAIFI criteria (after 'excluded interruptions' are disregarded), act as a trigger for investigation and exception reporting purposes.

The objective of this section is to ensure that feeders performing unsatisfactorily (i.e. outside of the performance criteria for that feeder type) are reported publicly and their performance tracked until performance is again satisfactory. The figures contained in Table 4.8 represent the ministerially imposed Licence Conditions for each feeder type.

Category	Feeder Categories			
	CBD	Urban	Short Rural	Long Rural
SAIDI	100	350	1000	1400
SAIFI	1.4	4.0	8.0	10.0

Performance outside this range results in the following actions:

- immediate investigation of the causes for each feeder exceeding the individual feeder standards;
- by the end of the quarter following the quarter in which the feeder first exceeded the standard, complete an investigation report identifying the causes and action required to improve the performance;
- complete any operational actions identified in the investigation report to improve the performance of each feeder to the *individual feeder standards* by the end of the third quarter following the quarter in which each feeder first exceeded the *individual feeder standards*;

- (d) where the investigation report identifies actions, other than operational actions, required to improve the performance of each feeder to the *individual feeder standards*, develop a project plan, including implementation timetable, and commence its implementation by the end of the second quarter following the quarter in which the feeder first exceeded the *individual feeder standards*;

Summarised performance against the above licence conditions is shown in Table 4.9.

<b>Table 4.9 Individual Feeder Performance against the Standard Summary</b>				
<b>Did</b>	<b>Feeder Type</b>			
	<b>CBD</b>	<b>Urban</b>	<b>Short Rural</b>	<b>Long Rural</b>
Feeders (Total Number each Type)	56	1739	261	4
Feeders that Exceeded the Standard During the Year (Total Number)	6	89	11	0
Feeders Not Immediately Investigated (Total Number)	0	0	0	0
Feeders Not Subject to a Completed Investigation Report by Due Date (Total Number)	0	0	0	0
Feeders Not Having Identified Operational Actions Completed by Due Date (Total Number)	0	0	0	0
Feeders Not Having a Project Plan Completed by Due Date (Total Number)	0	0	0	0

As required in clause 16.2 (b) and (c) of the Licence Conditions, each feeder currently exceeding the Individual Feeder Standard is analysed and an investigation report identifying the causes and, as appropriate, any action required to improve the poor performance is reported in the next quarterly performance report.

All actions required have been completed in the times required.

The details of currently poor performing feeders are shown in Attachment E. Overall, the percentage of poor performing feeders in each feeder category is relatively low.

Ausgrid has an ongoing reliability improvement program in place. The program targets those feeders that have exceeded or are approaching the Individual Feeder Standards as outlined in Schedule 3 of the Design, Reliability and Performance Licence Conditions.

## 4.5 Transmission Reliability

Transmission network indices and associated methodologies are defined in Attachment B.

### 4.5.1 Transmission Reliability Performance Data

<b>Table 4.10 Transmission Circuit Availability (%) Trend</b>					
<b>Objective</b>	<b>Previous Years</b>				<b>Current Year</b>
	<b>2006/07</b>	<b>2007/08</b>	<b>2008/09</b>	<b>2009/10</b>	<b>2010/11</b>
	97	97.19	97.98	96.67	97.14

This year's transmission availability is better than that of last year, with a 0.5 per cent increase in availability.

As in previous years, the transmission availability this year was heavily influenced by a large number of long duration outages associated with a major replacement programs, including a number of distance relay replacements and circuit breaker replacements. Such outages are typically of 3 weeks duration and have a long recall time. In addition, there were a number of long duration outages associated with major capital projects (such as the Top Ryde zone commissioning).

		Previous Years				Current Year
	Objective	2006/07	2007/08	2008/09	2009/10	2010/11
<b>Network Reliability</b> (Off Supply Event Numbers)		2	6	1	0	2

There were two transmission related loss of supply events this year. One event occurred due to the trip of a 132kV overhead line during strong winds co-incident with a planned outage on the remaining line, resulting in an interruption of supply to Somersby zone substation. The other event occurred due to a protection mal-operation co-incident with a 132kV cable fault that resulted in interruption to Drummoyne zone substation.

		Previous Years				Current Year
	Objective	2006/07	2007/08	2008/09	2009/10	2010/11
		2911	3924	3279	2291	3497

The average unplanned outage duration this year is higher than last year's reporting period. As with previous years, the long duration of unplanned outages reflects the long time taken to repair failed 132kV cables, particularly oil and gas insulated cables. In addition, a secondary cabling fire at a TransGrid bulk supply point resulted in two 132kV feeders being unavailable for a number of weeks.

Connection Point	Interruption Number	Interruption Duration Total (Minutes)
NIL	NIL	NIL

Note: This table provides a listing of customer connection points off supply events.

There were no connection point interruptions in the 2010/2011 period.

	Current Year
<b>Number of Connection Points (Total Number)</b>	17

Ausgrid has 5 transmission customers, supplied from 17 connection points.

## 5. Network safety

### 5.1 Overview

Ausgrid is committed to workplace and public safety. To meet our objectives in this regard, as well as relevant legislative and regulatory compliance requirements, we have implemented a number of safety programs and initiatives, both in relation to the safe operation of the network and workplace safety. These programs are summarised below in an extract from our Network Management Plan.

#### Safe operation of the network

Ausgrid has identified safety as a key network risk. To manage this risk, Ausgrid has undertaken strategic risk analysis of the types of hazardous events that may occur.

Ausgrid has identified various broad categories of risk relating to the safe operation of the network. At a strategic level, these are addressed in our Duty of Care Plan. The planned programs of work documented in our Duty of Care Plan are a key organisational safeguard against network safety risk.

In addition to these planned asset-related programs of work, Ausgrid has implemented various procedures and processes at an operational level for enhancing network safety, including:

- an Incident Management System for managing network incidents and network emergencies that enable rapid response to hazardous situations; and
- formal safety procedures and systems applicable when working on or near the network. This has both network safety and workplace safety implications.

#### Workplace Safety

Ausgrid is committed to workplace safety obligations to its staff and contractors under the *Occupational Health and Safety Act 2000* (NSW) (*NSW OH&S Act*) and the *Occupational Health and Safety Regulation 2001* (NSW) (*OH&S Regulation*). Successful implementation of workplace safety processes and procedures also has an impact, more generally, on network safety and contributes to the safe operation of the network. Ausgrid is a workers compensation self-insurer and is required under the self-insurance licence to maintain a health and safety management system in compliance with the National Self-Insurer OHS Audit Tool.

Ausgrid has comprehensive policies and procedures in place to ensure safe people, places and processes. Ausgrid conducts programs to identify workplace safety risks and implements initiatives to address these risks to ensure ongoing compliance with its workplace safety obligations, and consistent application of its commitment to safety.

Ausgrid's Workplace Health and Safety Management System is called Be Safe. The Be Safe Management System has two key objectives:

- the health, safety and welfare of all staff while they are at work; and
- ensuring that people other than our staff are not exposed to unacceptable risks to their health and safety in connection with Ausgrid's network operations.

The principal document in the Be Safe Management System is the Be Safe Policy. The Be Safe Policy articulates the organisation's commitments to health and safety including:

- eliminating or controlling any reasonably foreseeable occupational health and safety risks;
- a commitment to consultation with staff to enable them to contribute to decisions affecting their health, safety and welfare at work;
- ensuring the design, supply and use of plant and substances at work is safe and without risks to health when used properly;
- education and training programs to ensure staff and contractors are equipped with sufficient information to ensure their health and safety;
- preventing occupational injury and illness by all reasonable, practicable means;
- providing timely and cost effective injury management to promote early return to duties;
- maintaining a workers' compensation self-insurer licence;
- complying with the OH&S Act and OH&S Regulation, and maintaining an OH&S system that complies with Australian Standard AS/NZS 4801;
- adopting best practice standards where legislation or mandatory standards do not exist; and
- promoting community awareness of safety issues, through public education campaigns.

Ausgrid's safety objectives are to ensure that those working on or near the network are competent to do so, and can do so in the intended safe manner; and compliance with the OH&S Act and OH&S Regulation, which require employers such as Ausgrid to identify foreseeable hazards, assess the risks of these hazards and eliminate or control these risks and review these controls.

Ausgrid also publishes a "Public Electrical Safety Awareness Plan" to educate the general public, the construction industry and emergency services of the risks of working near network assets and the requirement for people working near those assets to be appropriately qualified and authorised (where required). Ausgrid has the following processes in place to meet these objectives:

- hazard assessment forms and safe work method statements have been developed in consultation with staff - external parties (such as Accredited Service Providers and contractors) are required to develop their own procedures and forms to submit to Ausgrid;
- competency-based training (based on relevant national training packages and in accordance with the principle outlined in Section 7 of the National electricity Network Safety Code "ENA NENS 01 - 2006");
- induction training for all new employees (both employees and contractors) is carried out in accordance with our Quality, Safety, Health and Environmental Management System;
- accreditation of service providers undertaking contestable work meets Code of Practice Contestable Works standards (and other applicable schemes) administered by the Office of Fair Trading;
- reporting of accidents and incidents – as specified by Industry & Investment NSW under the Significant Electrical Network Incidents reporting system (including those required under the Electricity (Consumer Safety) Regulation 2006); and
- reporting of customer installation incidents to the Office of Fair Trading (in accordance with the Electricity (Consumer Safety) Act 2004).

## 5.2 Serious Electricity Network Accidents (Public)

Ausgrid reported five Serious Electricity Network Accidents involving the public in 2010/11, as summarised in Table 5.1. All were classified as Serious Electrical Accidents (Public) as they involved electricity. This figure is comparable with previous years. One of the 2010/11 Serious Electrical Accidents involved a fatality.

These Serious Electricity Network Incidents are analysed by Ausgrid to form the development of its Public Electricity Safety Awareness Plan and campaigns to address the most significant issues for public safety such as preventing contact with overhead conductors and underground network assets.

Ausgrid continues its efforts to reduce these occurrences through the Public Electrical Safety Awareness Campaign which utilises a range of topical media releases and a variety of advertising mediums to alert the public to the risks involved when in proximity to the electricity network.

Year	Previous Years				Current Year
	2006/07	2007/08	2008/09	2009/10	2010/11
Non-Fatal	4	5	2	4	4
Fatal	-	-	-	-	1

### Incident 1 – Mt Hutton 31 October 2010

An 18 year old scaled a network power pole at Mt Hutton without authorisation or cause. He came into hand to hand contact with live, exposed overhead 240/415 volt conductors and fell from a height greater than 6 m. The victim had been attending a party nearby and had scaled the pole previously that evening, again without authorisation or cause. The investigation showed that he used the 11 kV ABS operating mechanism to ascend the pole. He was found unconscious at the base of the pole but pronounced deceased on arrival at the hospital.

The preventative actions arising from the incident investigation are:

- Continue the current policy and practice of installing new and replacement ABS with 'mid-pole' operating handles above 3.6 m in accordance with Network Standard NS126.
- Continue the current Public Electrical Safety Awareness Program.
- Review the current network against the Energy Network Association Document ENA DOC 015-2006 'National Guidelines for Prevention of Unauthorised Access to Electricity Infrastructure'.

#### **Incident 2 – Waverton 14 February 2011**

An employee of a private building construction company inadvertently cut through an energised 11kV underground cable with a nine inch angle grinder at Waverton. The resultant flash caused burns to his arms and legs.

This incident was awaiting the finalisation of the investigation report at the time this 2010/11 Electricity Network Performance Report was produced. The details will be provided in the next Electricity Network Performance Report once the incident investigation has been finalised.

#### **Incident 3 – Marsfield 21 February 2011**

A concrete pump operator was using an infra-red remote control to operate a concrete pump inside a new building site at Marsfield. The concrete pour for a foundation floor of the new house was just completed when the operator was positioning the pump boom for a “blow out” of the pump’s pipes. The operator received an electric shock when the top boom of the concrete pump made contact with an 11kV overhead street conductor. It appears that no observer was used to ensure that the concrete pump operator did not move the boom too close to the overhead 11kV or the overhead low voltage street mains.

This incident was awaiting the finalisation of the investigation report at the time this 2010/11 Electricity Network Performance Report was produced. The details will be provided in the next Electricity Network Performance Report once the incident investigation has been finalised.

#### **Incident 4 – Lorn (Maitland) 2 April 2011**

A helicopter flying joy flights from a site on the northern side of the riverbank adjacent the Belmore Bridge, Maitland, came in contact with the 11kV overhead feeder with its rotor. The impact severed the eastern conductor only. The conductor landed on the riverbank on both sides of the river and in the river. On the western (Maitland) side the conductor landed on a metal hand rail running along a path that follows the riverbank. A 3 year old boy was leaning on the rail about 200m from the fallen conductor and received a burn to his lower leg. He was treated at John Hunter Hospital and released on the same day.

This incident was awaiting the finalisation of the investigation report at the time this 2010/11 Electricity Network Performance Report was produced. The details will be provided in the next Electricity Network Performance Report once the incident investigation has been finalised.

#### **Incident 5 – Ashfield 23 April 2011**

An unknown person broke into Ausgrid substation in Ashfield and was attempting to steal copper conductor. As the victim attempted to hacksaw into an 11kV cable, an explosion occurred and the victim received electrical burns to his face and right side. The victim also suffered damage to his vision.

This incident was awaiting the finalisation of the investigation report at the time this 2010/11 Electricity Network Performance Report was produced. The details will be provided in the next Electricity Network Performance Report once the incident investigation has been finalised.

#### **Incident from previous reporting period**

Ausgrid did not have any Serious Electricity Network Accidents (Public) that were still under investigation at the time the 2009/10 Electricity Network Performance Report was produced.

### **5.3 Actionable Electricity Network Safety Incidents (Public)**

Ausgrid utilises the Significant Electricity Network Incident (SENI) reporting scheme to document actionable safety incidents.

An actionable safety incident is an incident, which is not a serious electricity network accident, involving the electricity network, but where there was a significant risk that a person (employee or member of the public) could have been seriously hurt by that incident, and meeting any of the following criteria:

- the circumstances of the incident indicate that there is a duty of care to inform other network operators who may need to act to properly to control a risk of serious injury (e.g. design defect in network equipment which may cause explosion or risk serious injury); or
- the risks indicated by the incident, and the probability of occurrence of the incident, are such that, in order to properly manage the safety risks, the network operator needs to modify its Network Management Plan

(including public safety awareness plan) or any standards, procedures, systems or other documents required to be implemented under that plan.

Ausgrid reported one Actionable Electricity Network Safety Incident (Public) in 2010/11. The number of Actionable Electricity Network Safety Incidents has remained low over recent years and Ausgrid considers this to be a significant trend.

It is Ausgrid's policy and commitment to protect customers and the community and raise their awareness of the dangers associated with electricity.

Year	Previous Years				Current Year
	2006/07	2007/08	2008/09	2009/10	2010/11
Non-Fatal	-	-	-	1	1
Fatal	-	-	-	-	-

#### Incident 1 – Carrington 2 December 2010

Damage occurred to an in-service 33kV underground cable (feeder 763 - Merewether STS to Carrington ZS) during an under bore operation by an Ausgrid contractor. The under bore machine did not strike the cable. However, it passed within minimum clearance distance of the cable and pushed or pulled underground debris into the cable sheath causing physical damage and subsequent operation of the protection system. The Ausgrid Network Standard NS156 ('Working Near or Around Underground Cables') had not been followed. All underground assets had not been positively identified prior to under bore commencing (as required by NS156). Ausgrid GIS information for the existing feeder cable was also found to be incorrect.

The preventative actions arising from the incident investigation are:

- Discussions to be held with the contractor on the need to fully comply with NS156.
- Correct the GIS information for specific site.
- Review NS156 for lessons learnt from this incident.

#### Incidents from previous reporting period

Ausgrid had one Actionable Electricity Network Safety Incident (Public) that was still under investigation at the time the 2009/10 Electricity Network Performance Report was produced. The incident investigations have subsequently been finalised.

#### Incident 1 – Collaroy Plateau 2 June 2010

An Optus Contractor was transferring the Optus assets from an Ausgrid limited life pole to a new pole adjacent. He removed the Ausgrid installed rope securing the old pole to the new pole. The old pole fell damaging the front porch of the adjacent house.

There was no preventative action arising from the incident investigation for Ausgrid. Optus and its contractor have implemented a corrective action to prevent a similar incident occurring in the future.

## 5.4 Serious Electricity Network Accidents (Network Worker and Accredited Service Provider)

Ausgrid reported five Serious Electrical Network Accidents (Network Worker and Accredited Service Provider) in 2010/11. Four of the Accidents were Serious Electrical Accidents while the other one was classified as a Serious Electricity Network Accident (Incident 1).

Table 5.3 Serious Accidents (Network Worker and Accredited Service Provider) Trend					
	Previous Years				Current Year
Year	2006/07	2007/08	2008/09	2009/10	2010/11
Employment Category					
Distributor Employees	4	3	3	5	5
Distributor Contractors	-	-	-	-	-
Accredited Service Providers	1	-	2	-	-

#### Incident 1 – Willoughby 13 July 2010

An Ausgrid employee was burnt by ignited cable fluid which had ruptured during the installation of a 132kV oil stop joint on the cable sheath at Willoughby sub-transmission substation.

The preventative actions arising from the incident investigation are:

- Jointers are made aware of the findings of the metallurgist's report and reminded of the consequences of high heat inputs into the sheaths of fluid filled cables.
- Use an infrared thermometer to monitor the temperature of sheaths during the application of transition / platform wipes.
- Introduce a site specific work method statement for all jointing of fluid filled cables where fluid flows are required.
- Crushing caps for fluid filled cables only to be used where there is no heating the aluminium sheath, or where fluid flows risks have been addressed in a site specific safe work method statement.
- Review and amend the PPE requirements for heat processes in the existing generic safe work method statement.
- Jointers are made aware that PPE requirement need to be routinely adhered to and documented.

#### Incident 2 – Padstow 14 August 2010

An Ausgrid employee was working on an overhead mains pole with live low voltage aerial bundled conductor (ABC) at Padstow. The employee made a connection between two different phases, which resulted in a phase-to-phase fault producing an electrical flash that caused burns to the worker's neck and arm. First aid was applied on site before the injured man was taken to hospital for examination and treatment (and discharged the same evening).

Positive identification of cable was not maintained combined with staff having lost sight of identified cable between conducting lamping test and making final connection. Also the staff involved used an outdated procedure for connecting ABC.

The preventative actions arising from the incident investigation are:

- A Distribution Guideline was prepared and distributed to advise staff of correct procedure for connection of low voltage ABC.
- Investigation is being conducted into alternative methods of marking phases during lamping process.
- Investigation is being conducted into alternative insulated piercing connectors with integrated test points.

#### Incident 3 – Redfern 11 April 2011

An Ausgrid employee received flash burns to the face and arms when using an uninsulated shifting spanner to unbolt tails in an overhead link box at Redfern. The spanner came into contact with 2 phase posts at the same time, causing an electrical flashover. The employee was wearing a long sleeved cotton shirt, low voltage insulating gloves with leather outer gloves, and personal sunglasses. These items were all badly burnt by the flash.

Incorrect tool and procedure had been used. The employee had also been ill during the week and believed that this had affected his judgment.

This incident was awaiting the finalisation of the investigation report at the time this 2010/11 Electricity Network Performance Report was produced. The details will be provided in the next Electricity Network Performance Report once the incident investigation has been finalised.

#### **Incident 4 – Padstow 14 April 2011**

An Ausgrid employee received flash burns to the face whilst bonding through live low voltage aerial bundled conductor overhead mains on a power pole at Padstow. The line worker has made a connection between two different phases causing a phase-to-phase fault.

This incident was awaiting the finalisation of the investigation report at the time this 2010/11 Electricity Network Performance Report was produced. The details will be provided in the next Electricity Network Performance Report once the incident investigation has been finalised.

#### **Incident 5 – Cherrybrook 9 May 2011**

An Ausgrid employee received flash burns to his eyes while reconnecting a service cable to a pillar box at Cherrybrook. During reconnection a 'B' phase to 'C' phase fault occurred across the pillar terminals causing a flash.

This incident was awaiting the finalisation of the investigation report at the time this 2010/11 Electricity Network Performance Report was produced. The details will be provided in the next Electricity Network Performance Report once the incident investigation has been finalised.

#### **Incidents from previous reporting period**

Ausgrid had two Serious Electrical Network Accidents (Network Worker and Accredited Service Provider) that were still under investigation at the time the 2009/10 Electricity Network Performance Report was produced. The incident investigations have subsequently been finalised.

#### **Incident 1 – Hunters Hill 28 April 2010**

Two Ausgrid employees were changing a live 415V underground to overhead connection and in the process connected two phases together at Hunters Hill. The two employees received flash burns from the resulting electrical arc and explosion.

The preventative actions arising from the incident investigation are:

- The method of connecting two live ABC bundles to a link box as taught by the apprentice training school is to be documented and included in the training notes supplied by the training school.
- A Distribution Guideline is to be prepared and distributed highlighting the need to adhere to the connection method taught by the training school.
- Investigate the possibilities of an alternate design with the suppliers of IPC's which allows for a test point within the IPC.

#### **Incident 2 – Rutherford 12 May 2010**

An Ausgrid employee was installing a 1000W floodlight on a substation pole from an elevated work platform at Rutherford. While fitting the floodlight to the underside of the cross-arm, the floodlight made contact with the nearest fuse and the neutral bar resulting in a flashover. The employee received flash burns and dropped the floodlight, interrupting the short circuit.

The preventative actions arising from the incident investigation are:

- Review the EnergyLight floodlight sales and design process to ensure only suitable sites are offered.
- Review the design documentation provided to field staff for EnergyLight floodlight installations to ensure that there is a clear installation plan.
- Review the pole drilling tools and equipment.
- Review the matting supplied and installation procedure for LV substation fuses.
- Review the hazard identification processes when the planned task execution changes.
- Identify existing EnergyLight installations on substation poles and develop maintenance/decommissioning plan.
- Investigate the confusion between the neutral pins and substation earth bond and look at ways to differentiate the installations.
- Review the Ausgrid training process for tools and equipment used to dress poles.
- Review the Ausgrid training processes related to identifying hazards when working on or near live equipment.
- Review the use of tools and equipment at height to develop guidelines on the use of lanyards and/or drop zones.

## 5.5 Actionable Electricity Network Safety Incidents (Network Workers)

Year	Previous Years				Current Year
	2006/07	2007/08	2008/09	2009/10	2010/11
Number	2	-	-	-	3

### Incident 1 – Berowra 10 July 2010

Whilst conducting a primary injection test on an out of service 132kV feeder at Ausgrid's Berowra Zone Substation, an Ausgrid employee opened an earthing switch resulting in induced voltages being discharged through the test equipment to earth. The induced voltages occurred due to mutual coupling between the out-of-service 132kV Ausgrid feeder and the in-service 330kV TransGrid feeder combined with the lack of an effective earth at TransGrid Sydney North Bulk Supply Point. No electric shock was received by any Ausgrid employees.

The preventative action arising from the incident investigation is:

- A new work procedure has been written outlining the procedures to be followed by Ausgrid staff when conducting primary injection tests on 132kV feeders. The work procedure required staff to maintain a 5 metre clearance from the primary injection test equipment when removing the final local end earth and for the duration of the primary injection test.

### Incident 2 – Kooragang Island 11 September 2010

Two Ausgrid employees were working from an Elevated Work Platform (EWP) to assist operators to open an air break switch (ABS) on the 33kV system on Kooragang Island. As the ABS opened an arc formed leading to an arc flash at the ABS. The line workers were not injured in the incident, but hardware on the pole was damaged by the arc flash.

The preventative actions arising from the incident investigation are:

- Review the current practice of assisted ABS opening.
- Review the switching planning process to break network rings on Kooragang network.
- Review options to provide additional SCADA monitoring on the Kooragang network.
- Investigate the provision of additional network open points on the Kooragang network.
- Review the management of known faulty network equipment.
- Review Ausgrid arc flash management processes.
- Review use of Air Break Switches in high load applications where current breaking is required.

### Incident 3 – Tomago 18 February 2011

Four Ausgrid staff were in the process of setting up for indoor switchgear testing. During this setup an employee inadvertently energised the testing transformer by incorrectly connecting supply leads. Another employee came into contact with electricity as his right shoulder was leaning against the test transformer as it became energised. This employee was taken to hospital for observation only.

This incident was awaiting the finalisation of the investigation report at the time this 2010/11 Electricity Network Performance Report was produced. The details will be provided in the next Electricity Network Performance Report once the incident investigation has been finalised.

### Incident from previous reporting period

Ausgrid did not have any Actionable Electricity Network Safety Incidents (Network Workers) that were still under investigation at the time the 2009/10 Electricity Network Performance Report was produced.

## 5.6 Major Incidents Reports

Ausgrid's Incident Management System (IMS) provides an organisation wide system for managing all types and severity of incidents. The IMS documents the procedures followed by Ausgrid in terms reporting major and high severity incidents to the Minister for Energy, as required under the Design, Reliability and Performance licence conditions.

The IMS does this by linking definitions of incident severity to the licence conditions and by stipulating the reporting timeframes by incident severity.

During 2010/11 there were eight major incidents whereby the Minister for Energy was notified in accordance with the Design, Reliability and Performance licence conditions. These incidents are outlined below:

#### **Incident 1 – Sydney North Outage – Wednesday 7 July – Major Incident**

A major incident was declared when TransGrid's 132kV busbar at their Sydney North substation tripped as a result of a fire in the secondary protection wiring. Supply was interrupted to various Ausgrid's 132 kV feeders. As a result supply was lost to Pennant Hills, Berowra, and Hornsby zone substations. Approximately 55,000 customers were interrupted for between 4 hours and 4 hours 33 minutes.

#### **Incident 2 – Sydney East Fatality – Thursday 16 September - Major Incident**

A major incident was declared in response to a fatality of a civil contractor who was working for TransGrid within their Sydney East substation. The civil contractor had come into contact with the sheath earthing system associated with Ausgrid's 9E1 feeder, which was energised at the time. There were no customer interruptions as a result of the incident. Notification to the Minister was undertaken by TransGrid as it involved both their contractor and their substation.

#### **Incident 3 – Mt Hutton Fatality – Sunday 31 October – Major Incident**

A major incident was declared in response to a fatality involving an 18 year old male who had scaled an Ausgrid power pole at Mt Hutton. The investigation showed that he used the 11kV ABS operating mechanism to ascend the pole. He fell to ground with no damage to the pole or equipment on it. The cause of death was determined by the coroner to be as a result of electrocution.

#### **Incident 4 – Sydney East No. 8 Transformer Sealing End Outage – Monday 31 January – Major Incident**

A major incident was declared when the 132/33kV transformer No. 8 at Sydney East sub-transmission substation tripped as a result of a failed transformer sealing end, interrupting the supply to the 33kV busbar at Sydney East. At the time, the other 132/33kV transformer that supplies Sydney East was out of service for a bushing replacement. Supply was interrupted to Narrabeen, Mona Vale, Terrey Hills, Newport, and Careel Bay zone substations. Approximately 29,000 customers were interrupted for between 1 hour 54 minutes and 3 hours 40 minutes.

#### **Incident 5 – Enfield Feeder Outage – Wednesday 2 February – Major Incident**

A major incident was declared when a 33kV feeder (feeder 641) which supplies Enfield zone substation tripped due to an underground cable fault. Another 33kV feeder (feeder 640) was already out of service due to an underground cable fault that had occurred during the night. The third 33kV feeder (feeder 639) had been out of service due to a previous fault and was to be returned to service when the 33 kV feeder 641 tripped. Supply was interrupted to Strathfield, Croydon Park, Burwood Park and Enfield. Supply was restored via switching, and deployment of up to 25 mobile generators. Load shedding was required during the first 24 hours of the incident to maintain loads below the ratings of the remaining in-service equipment. In addition, emergency 11 kV network augmentation work and the deployment of a new mobile 33/11kV substation enabled substation loads to be kept below equipment ratings preventing further requirements for load shedding.

#### **Incident 6 – Marsfield concrete Pump Truck – Monday 21 February – Major Incident**

A major incident was declared when a concrete pump truck driver received an electric shock when the boom on the truck was raised into the 11kV overhead conductor at Agincourt Rd, Marsfield. The truck driver was hospitalised for several days as a result of the electrical shock, but he received no major injuries and was later released.

#### **Incident 7 – Lorn (Maitland) Helicopter incident – Saturday 2 April – Major Incident**

A major incident was declared when the rotor on a helicopter came in contact with the 11kV overhead feeder 48122. The helicopter was carrying out joy flights from a site on the northern side of the riverbank adjacent to Belmore Bridge, Maitland. The impact severed the eastern conductor only (Lorn side), causing the conductor to land on the riverbank (both sides) and in the river. On the western side (Maitland side), the conductor landed on a metal hand rail running along a path that follows the riverbank. A 3 year old boy, who was leaning on the rail at the time, received a burn to his lower leg. The boy was treated at John Hunter Hospital and released on the same day.

## Incident 8 – Bland Street Ashfield Sub Break-in – Saturday 23 April – Major Incident

A major incident was declared when police informed Ausgrid of an attempted copper theft in Bland Street Ashfield resulted in a person being hospitalised due to electrical burns. The person had broken into the distribution substation and was attempting to hacksaw an energised 11 kV cable when he received the electrical burns. The cable was repaired and the substation resecured.

## 6. Customer Installations

From January 2000, Ausgrid has maintained a computer database (SAP – CCS) for recording installation work notified by electrical contractors. The database is also used for selecting work on an audit basis for inspection. Submission of a NSW Fair Trading Certificate of Compliance – Electrical Work (CCEW) form for notification has been required since January 2007. The purpose of the installation inspection is to verify compliance of electrical contractor's work with AS/NZS3000 - Wiring Rules, the Service and Installation Rules of NSW and any other relevant standards.

The installation inspection audit process targets electrical contractors whose previous work has been found to contain major safety breaches (major defects) as detailed in the Code of Practice for Installation Safety Management. Electrical contractors with higher major defect rates are inspected more often. The reliability of the data collected and the reported using SAP – CCS has been verified previously by external audit of Ausgrid's eight previous annual Electricity Network Performance reports.

Consistent with previous years, the major causes of customer electric shocks in the reporting period fell into two specific categories – "Failure of Part of Installation" (more specifically insufficient insulation resistance), and faulty neutral connections. Ausgrid is continuing an extensive program to replace all at risk aged service lines, carrying out neutral integrity tests at targeted customer installations in conjunction with the Sydney Water mains replacement program, and implementing a trial of the "Wirealert" device that was developed by Aurora Energy and rolled out in Tasmania in early 2009/10.

### 6.1 Reports against Customer Installation Safety Plans

There has been a major increase (89%) in the number of notifications of electrical installation work from electrical contractors (CCEW). This is due to applications and connections associated with the NSW Solar Bonus Scheme and its various amendments, particularly the change from 60 cents/kWh to 20 cents/kWh in October 2010. This created an avalanche of applications for connection over a three week period. Ausgrid has adopted a policy to inspect all solar installations rather than an audit program due to the increase in inexperienced installers, more complex metering configurations and new technology that feeds into the network. This has resulted in the percentage of installations inspected rising from 32% in 2008/09 to 42% and this year 64%.

Year	Previous Years				Current Year
	2006/07	2007/08	2008/09	2009/10	2010/11
Number of Notifications (CCEW)	47,851	45,138	45,093	47,799	90,291
Number of Inspections	14,797	13,705	14,396	20,110	57,879
Installation Inspection Rate (%)	30.92%	30.36%	31.93%	42%	64%
Major Safety Defect Rate (%)	6.70%	6.33%	7.39%	5.3%	2.92%
Safety Breach Notices Issued (%)	16.79%	16.72%	18.67%	13%	2.36%
Number of Warnings Issued	15	30	29	22	18
Reports to Fair Trading (No.)	12	11	2	9	9
Number of Audits by Distributor	3	3	3	3	3

The trends in 2010/11 continue to indicate that electrical contractors are only submitting notifications when the electrical installation work is associated with contestable service work. The number of notifications for Level 2 Service Provider contestable work (NOSW) has increased by 67% from the previous year. This increase is also attributed to the NSW Solar Bonus Scheme and the associated contestable metering work which requires submission of a NOSW.

The major defect rate of 2.92% is significantly lower than last year (5.3%). This lower than expected number can be attributed to the 89% increase in CCEW's submitted. The low number of major defects also relates to no reported shocks from unsafe electrical contractor installation work.

Ausgrid has been assisting the NSW Fair Trading with their electrical contractor compliance campaigns by providing CCEW notification data when requested and has entered a Memorandum of Understanding for mutual cooperation on electrical installation safety matters. Ausgrid is also conducting "Targeted Inspections" of specific large developments like shopping centres and unit blocks, concentrating on the electrical contractor's compliance with Australian Standards as well as the submission of CCEW's for new electrical work.

Ausgrid is represented on related Australian Standards committees such as AS/NZS3000 and AS/NZS3017 as well as the Service and Installation Rules of NSW to ensure the focus on customer installation safety is maintained and improved in the review process.

Ausgrid has also become a member of the Clean Energy Council (CEC). The CEC are the peak solar industry body across Australia. They accredit electrical contractors to solar install solar panels and systems and also complete compliance audits of completed solar work. Ausgrid has worked closely with the CEC on all matters relating to solar inspections and has presented at their annual ATRAA 2011 Solar Installers conference.

A trial of the "Wirealert" device (developed by Aurora Energy and which is being rolled out in Tasmania), commenced in early 2009/10 and was completed in 2011. The Wirealert device is a supply monitoring device that plugs into a power point and detects potentially dangerous situations arising from a combination of a faulty neutral and earth connections. Ausgrid issued 500 devices to Ausgrid staff and 2500 devices to customers with older higher risk electrical installations. The trial is continuing as customers report alarms from the devices and subsequent investigations are carried out.

Ausgrid and Sydney Water are jointly funding the testing of each installation neutral connection impacted by their water main replacement program. Suspected faults are investigated by Ausgrid staff and rectified where necessary. Ausgrid are also making arrangements to conduct post water main replacement tests and convert older direct earthed installations to the current MEN earthing.

## 6.2 Customer Installation Shock Reports

During 2010-11, Ausgrid recorded a 5.5% increase in reported electric shocks. There were three fatalities where the possible cause was electrocution associated with customer's electrical installations and one fatality associated with contact with network distribution mains. Of the three customer installation fatalities, one was confirmed as due to contact with live exposed conductors however, two could not be determined due to the delay in emergency authorities advising Ausgrid in time to carry out an investigation. This delay resulted in the site being tampered with preventing a comprehensive investigation and a conclusive outcome.

Ausgrid continues to run public safety awareness programs and advertising campaigns highlighting the inherent dangers of electricity and precautions that should be taken.

Year	Previous Years				Current Year
	2006/07	2007/08	2008/09	2009/10	2010/11
Shocks on Customer's Premises (Number Reported)	402	311	309	344	363

Note: Shocks found to be caused by static electricity are to be included in the report.

## 7. Contestable Works Scheme

An analysis of the contestable works trends in 2010/11 shows an increase (13.6%) in the total number of project notifications associated with Level 1 contestable work compared to 2009/10. Figures obtained for Level 2 contestable work show a 67% increase in the total number of notifications (NOSW) compared to 2009/10. The significant increase in Level 2 activity is attributed to contestable metering work associated with the introduction of the NSW Solar Bonus Scheme.

### Level 1 Contestable Work

Overall there was an increase (16.9%) in Level 1 work being carried out by external ASP's. The very low number of contestable projects carried out by internal (Ausgrid) service providers continued. Ausgrid found it necessary to implement disciplinary/corrective action on 38 occasions as a result of unsafe practices by external ASP's.

Ausgrid commenced an ASP Safety Forum to establish a clear safety communication channel between Ausgrid and all Level 1 ASP's. There are currently 15 Level 1 ASP companies attending regular safety forum meetings. Ausgrid has informed Level 1 ASP's via safety alerts and notifications of changes to Network Standards and the potential safety hazards associated with inadequate excavation procedures, working on live low voltage, using machinery, working with 33kV underground cables and using sub contracted staff to carry out contestable work. There were zero safety incidents involving Level 1 ASPs that resulted in loss time injuries.

### Level 2 Contestable Work

Ausgrid carried out 60,746 inspections of Level 2 completed work for compliance with the standards. This is a 128% increase from 2009/10 and is due to the roll out of the NSW Solar Bonus Scheme and the higher level of inspections required for electronic bidirectional metering associated with embedded generators. Ausgrid also carried out 182 safety compliance audits on Level 2 "work in progress". 60 corrective/disciplinary interviews were conducted and 14 Level 2 ASP authorisations were suspended for non-compliance. NSW Department of Trade & Investment, Regional Infrastructure & Services (DTIRIS) has commenced a review of the Accreditation Scheme. As a member of the advisory panel, Ausgrid is heavily involved in the development of a more comprehensive scheme that better manages accreditation of ASPs carrying out contestable works.

Year	Previous Years								Current Year	
	2006/07		2007/08		2008/09		2009/10		2010/11	
Category	Int	Ext	Int	Ext	Int	Ext	Int	Ext	Int	Ext
<b>Network Work (Level 1)</b>										
Project approvals	99	221	56	379	24	444	24	461	12	539
Projects inspected by the DNSP	77	110	46	219	31	294	22	286	10	379
No. of projects with initial major defects	6	60	3	80	0	108	0	72	0	92
<b>Customer Connection Work (Level 2)</b>										
Notifications (NOSW)	8,471	66,309	5,963	51,158	5,426	53,015	4,742	59,057	12,041	94,463
Projects inspected by the DNSP	2,041	19,544	1,500	15,628	1,763	16,542	2,176	24,474	4,401	56,345
No. with initial major defects	9	302	11	219	8	195	7	243	43	281
<b>Network Design Work (Level 3)</b>										
Designs Certified	268	193	161	328	106	327	451	13	42	552

Note:

"Int" refers to contestable work done by the distributor's Accredited Service Provider entity and "Ext" refers to work done by independent Accredited Service Providers..

Notification refers to a notice from an ASP to the Distributor of work being carried out.

## 8. Bushfire Risk Management

Ausgrid's Bushfire Risk Management strategies are intended to:

- ensure public safety;
- establish standards for vegetation management near electricity lines (particularly in bushfire prone areas);
- reduce interruptions to electricity supply that are related to vegetation; and
- minimise the possibility of fire ignition by electricity lines and associated equipment.

The Bushfire Risk Management Plan forms part of Ausgrid's consolidated Network Management Plan, which was updated as required under the Electricity Supply (Safety and Network Management) Regulation 2008. The Bushfire Risk Management Plan was last reviewed February 2011, as part of the Network Management Plan review. The Bushfire Risk Management Plan contains further details of how we manage bushfire risk.

Ausgrid continues to identify bushfire prone areas from bushfire prone land maps certified by the Commissioner for the Rural Fire Service (RFS). Ausgrid has a formal agreement in place with the RFS to use these maps to identify our assets in these bushfire prone areas – these are updated annually before the bushfire season so the appropriate asset inspections can be completed. The latest update to these maps occurred in May 2011, following the receipt from the RFS.

Refer to Table 8.2 for details of the initiatives that Ausgrid has undertaken in the last year to improve systems used to manage bushfire risk within our network area.

Year	Previous Years				Current Year
	2006/07	2007/08	2008/09	2009/10	2010/11
Assets in bush fire prone areas checked by pre-summer inspection %	100%	100%	100%	100%	100%
Private lines in bush fire prone areas checked by pre-summer inspection %	See Note 1	See Note 1	See Note 1	See Note 1	See Note 1
Fire ignitions by network assets (Number)	2	0	4	6	4
Complaints from the public regarding preparation for the bush fire season (Number)	Not discernable See Note 2.	Not discernable See Note 2.	Not discernable See Note 2.	Not discernable See Note 2.	Not discernable See Note 2.

Note 1: Bushfire risk management for electrical equipment is a shared responsibility between Ausgrid and all landowners/occupiers who are customers in our distribution area. Ausgrid inspects, tests and maintains the assets we own. However, it is the responsibility of landowners/occupiers to ensure their electrical installations are free from defects that could cause fire or other hazards. Customers are responsible for keeping private overhead powerlines free of vegetation, and must ensure appropriate trees are planted in areas that are close to powerlines. Customers are also responsible for inspecting, testing and maintaining their powerlines and poles at regular intervals – the same way Ausgrid does.

Ausgrid uses the Service & Installation Rules of NSW to determine the delineation of private electrical installations from network assets. Our requirements for the inspection and maintenance of private aerial mains are detailed in our publication ES1 Customer Connection Information, our Standard Form Customer Connection Contract and the Network Standards referenced in ES1. Under the Electricity Supply (Safety and Network Management) Regulation 2008, we have taken into account the Industry & Investment NSW Code of Practice (Electricity) – Service & Installation Rules of NSW, October 2006. The Service and Installation Rules of NSW are prepared in accordance with the Code of Practice.

Information on Private Lines is not currently held by Ausgrid in any of our information systems as they are not Ausgrid assets. Ausgrid will make the required system changes to enable reporting of this statistic throughout the course of 2011/12 should the Department require this measure on an ongoing basis.

Note 2: The majority of the preparations on Ausgrid's network for the bushfire season relate to the clearing of vegetation. Ausgrid has adopted a vegetation strategy designed to maintain vegetation safety clearances at all times, which requires vegetation clearing to be undertaken throughout the entire year, not just at times of preparation for the bushfire season. As our systems are required to record all vegetation related inquiries and complaints, it is not possible to provide an accurate estimate of those that relate specifically to works undertaken in preparation for the bushfire season. Ausgrid will make the required system changes to enable reporting of this statistic, should the Department require this measure on an ongoing basis.

<b>Initiative</b>	<b>Description</b>
1	Ausgrid has continued its monthly reporting process with additional focus on high priority outstanding corrective works that pose a genuine risk in bushfire areas.
2	Ausgrid has established capital and replacement programmes to remove equipment with known failure modes that may initiate bushfires during equipment failure.
3	Ausgrid distributes bushfire risk management information which outlines customer's obligations regarding safety management of their electrical installations.
4	Vegetation management plans involving mechanical clearing of 66kV and 132kV overhead lines in areas where poor reliability of electricity supply has occurred due to vegetation.
5	Review of vegetation management policy and standards following the Victorian bushfires and preliminary recommendations of the Victorian Bushfires Royal Commission finalised.
6	Continued liaison with Rural Fire Service, NSW Fire Brigade, councils and other authorities

The following sections provide further information on the initiative described above.

## 8.1 Monthly and Quarterly Reporting Process

Pre-bushfire season patrols of poles, lines and associated apparatus are undertaken annually in accordance with Ausgrid's Technical Maintenance Plan. The outcomes of these inspections including defects, maintenance and rectification works is captured in Ausgrid's integrated Asset Management System. Ausgrid has improved the process for notifying a customer where a Line Patrol Report indicates defects exist on a customer's installation in a bushfire prone area.

Ausgrid has continued its monthly reporting process to Senior Management on outstanding corrective work in bushfire prone areas.

Table 8.3 provides a summary of the number of defects identified and rectified under the 2010/11 Preventative Maintenance program in bushfire prone areas. Please note that not all tasks identified during 2010/11 will be of such high priority that they need to be completed prior to the end of the year.

<b>Number of defects:</b>	<b>Central Coast</b>	<b>Upper Hunter</b>	<b>Lower Hunter</b>	<b>Newcastle</b>	<b>Sydney North</b>	<b>Sydney South</b>
Outstanding pre 2010/11	128	161	534	609	150	30
Identified in 2010/11	1855	631	1329	2740	1224	201
Rectified in 2010/11	1801	533	903	2127	1179	195
Outstanding and due or overdue as at end 2010/11	160	171	710	1043	347	76

Note 1: The regions reported in the table above are based upon Ausgrid's Field Services depot areas. These six depot areas cover all of the bushfire affected regions identified in the Network Map included in Section 1: Profile (figure 1).

Note 2: In some regions a number of the defects identified in the previous year were rectified during 2010/11.

Note 3: Due to differing defect priorities, not all defects identified during the 2010/11 year fall due within the 2010/11 year. The table above will not directly summate as a result.

Note 4: High priority defects detected during 2010/11 but not yet rectified by the 30th June 2011 are expected to be rectified prior to the 2011/12 bushfire season.

Note 5: The Sydney East region is not considered to be bushfire prone and is excluded from the table.

## **8.2 Capital and Replacement Programmes**

Ausgrid has continued its low voltage spreader capital programme to reduce the likelihood that low voltage overhead powerlines will cause bushfires. If overhead powerlines clash together, the resulting arcing has the potential to cause a fire - low voltage spreaders are used to prevent powerlines clashing and therefore significantly reduce the likelihood of fire. Ausgrid installed an additional 520 low voltage spreaders this year, 431 of these in bushfire-prone areas.

The Ausgrid Replacement plan for the 2009/14 regulatory period also includes;

- Replacement of over 40 kilometres of steel overhead mains per year – much of this will be replaced with new covered conductor.
- Replacement of over 500 air break switches per year with new air break switches with enclosed load-break contacts which contain any arcing produced during switching operations.
- Replacement of over 130 oil-filled reclosers and sectionalisers with modern gas-filled equipment.
- Replacement of over 22,000 low voltage services per year.
- Continuation of the overhead mains access track refurbishment programme which benefits Ausgrid as well as the RFS during times of bushfire by providing improved access to fight fires as well as carry out repairs to restore electricity supply.
- Replacement of defined types of insulators known to be at end-of-life on 132kv Transmission lines.

## **8.3 Communicating with Customers**

During 2010/11, Ausgrid distributed a brochure to targeted landowners located in bushfire prone areas in the Hunter, Central Coast and North Sydney regions. Titled “Your powerlines: safety and bushfire prevention”, the brochure outlines:

- contact details (phone and website) for the NSW Rural Fire Service to enable the customer to assess whether their property is located within a bushfire prone area;
- the demarcation between Ausgrid’s network and private powerlines;
- the responsibilities of the landowners with respect to the ownership of private poles and mains;
- what to look for with respect to the inspection of private poles and mains; and
- a reference to the Ausgrid website for contact details of companies which employ qualified pole inspectors, authorised tree trimmers and licensed electrical contractors who can inspect or repair private powerlines.

Further information on how we communicate risk with our customers is outlined in our Public Electrical Safety Awareness Program.

## **8.4 Review of Vegetation Management Policy and Standards**

Following the outcomes of the Victorian Bushfires Royal commission, Ausgrid has reviewed the policy and standards for vegetation management. The reviewed policy and standards were developed in accordance with, and comply with, the Australian electricity industry vegetation management standards.

## **8.5 Monitoring of the Victorian Bushfire Royal Commission**

Throughout the course of 2010/11 Ausgrid has been working with industry, government and other stakeholders to consider and evaluate the final recommendations of the Victorian Bushfires Royal Commission (VBRC) participating in industry workshops at a national level. Ausgrid will continue to work with key agencies such as Energy Safe Victoria (ESV), as they review all options to reduce the risk of catastrophic bushfires from the electricity supply. The ESV Taskforce is to recommend to the Victorian Government, by 30 September 2011, a plan to reduce bushfire risk within 10 years. Ausgrid will evaluate the applicability of the plan in the NSW context, and the ongoing operation of our network in bushfire prone areas, once finalised.

## 8.6 Liaison and consultation with Fire Services and others

Ausgrid continues to build strong relationships with the RFS and NSW Fire Brigade, as well as maintaining relationships with local councils, National Parks and Wildlife Service and other stakeholders.

Ausgrid participates in Regional Bushfire Management Committees across its supply area. These forums give focus to parts of our network that need a higher priority of protection in the event of a bushfire, as well as providing feedback to Ausgrid from the other authorities and local councils of assets that have an impact on the other authorities operating effectively. An example of this is where the RFS has identified locations where marker balls need to be installed on transmission lines.

## 9. Public Electrical Safety Awareness

Ausgrid is committed to increasing awareness amongst the general public of electrical safety. This commitment is demonstrated through the development and implementation of a Public Electrical Safety Awareness Plan (PESAP). This section describes the PESAP program in 2010/11.

### 9.1 Issues

The PESAP program is designed to highlight the risks associated with the distribution of electricity on the network's assets (i.e. powerlines and substations) and to educate the public about how to avoid dangerous situations.

The risks outlined in PESAP have been identified as hazardous since electricity was first distributed and continue to be the core issues that pose the greatest risk to the public. These issues require ongoing communication, education and awareness to reduce the risk of injury.

### 9.2 PESAP Programs

Outlined in Table 9.1 are the PESAP programs implemented by Ausgrid during 2010/11, including the description of the target market, the key messages and a description of each program, the medium through which it was delivered and an analysis of the program. A significant amount of information and downloads relating to preventing and managing electrical hazards is on Ausgrid's website.

Ausgrid monitors the programs and electrical safety incidents and adapts its programs as required to continue to reduce the likelihood of incidents occurring. The broad nature of "electrical safety" and the low number of Serious Electrical Network Incidents (SENIs) makes it difficult to statistically analyse the effectiveness of the programs.

Reach & Frequency provides an analysis of the percentage of persons in a target population that is exposed to an advertising schedule at least once (Reach), and the average number of times it has been heard (Average Frequency).

	Target Group	Messages	Program Overview	Analysis
Overhead Powerline Safety	Tradespeople, outdoor workers, truck drivers, machinery operators, construction workers, scaffolders, painters etc. General community.  General community	<ul style="list-style-type: none"> <li>Have up-to-date maps/diagrams showing the location of powerlines on the property/worksite, also indicating safe traffic paths</li> <li>Ensure operators are aware of the height and reach of their machinery in both stowed and working positions</li> <li>Assign a competent safety observer to each work team to guide machinery movements near overhead powerlines</li> <li>Where possible, provide ground</li> </ul>	<ul style="list-style-type: none"> <li>In October 2010 EnergyAustralia launched a new overhead powerline safety campaign titled "What do we have to do to get you to look up?"</li> <li>This campaign specifically targets outdoor workers /tradesmen to raise awareness of the dangers associated with overhead powerlines and educate on safe behaviours and</li> </ul>	<p><b>Radio Reach and Frequency (per burst)</b></p> <p>Market: Sydney</p> <p>Target: M25-54 (Pot: 995,000)</p> <p>Reach: 1+ 50.5%, 3+ 32.4%, Ave Freq:8.1x</p> <p>Market: Newcastle</p> <p>Target: M25-54 (Pot: 108,000)</p> <p>Reach: 1+ 72.3%,</p>

Table 9.1 PESAP Programs implemented during 2010/11

	Target Group	Messages	Program Overview	Analysis
		<p>barriers and make overhead powerlines at ground level</p> <ul style="list-style-type: none"> <li>• Lower all machinery to the transport position when relocating every time</li> <li>• Work away from powerlines not towards</li> <li>• Ensure maintenance of machinery and activities are carried out well away from powerlines</li> <li>• Powerline heights vary so do a visual inspection before passing under or near them.</li> <li>• Set-up or build structures well away from powerlines.</li> </ul>	<p>work practices.</p> <ul style="list-style-type: none"> <li>• The campaign comprises of 3 radio advertisements, 2 print advertisements, 6 radio live reads, online banners and NRL rotating signage.</li> <li>• The campaign ran in 2 bursts – Oct/Nov 10 and May/June 11.</li> <li>• Radio is a key medium for this target group as it is present on building sites and in vehicles.</li> <li>• The new creative is also being used for construction industry posters, the CFMEU safety handbook and associated promotional material.</li> <li>• An overhead powerline safety message is included in our monthly radio safety campaign.</li> </ul>	<p>3+ 53.2%, Ave Freq:11x</p> <p>Market: Central Coast</p> <p>Target: M25-54 (Pot: 57,100)</p> <p>Reach: 1+ 72.6%, 3+ 49.2%, Ave Freq:7.1x</p> <p><b>Press Reach and Frequency</b></p> <p>Potential: 87,000</p> <p>Reach: 1+ 26.1%, Ave Freq: 1.14x</p>
Underground Cables	<p>Tradespeople, outdoor workers, machinery operators, construction workers, scaffolders, painters etc. General community.</p> <p>General community</p>	<ul style="list-style-type: none"> <li>• Always Dial Before You Dig</li> <li>• Make sure that you have the latest cable plan available</li> <li>• Keep a copy of the cable plan on site at all times</li> <li>• Make sure the excavation work is conducted or directed by staff who are trained to read the plan</li> <li>• Hand dig until the exact location of the cable has been established</li> <li>• Have on site at all times a first aid kit</li> </ul>	<ul style="list-style-type: none"> <li>• Ausgrid's underground cable safety program incorporates an awareness campaign which specifically targets outdoor workers/tradies to raise awareness of the dangers associated with digging and working near underground cables.</li> <li>• The campaign comprises of 3</li> </ul>	<p>Results from Ausgrid's Electrical Safety Survey 2010 showed over 75% of respondents were aware of the DBYD service.</p> <p><b>Radio Reach and Frequency (per burst)</b></p> <p>Market: Sydney</p> <p>Target: M25-54 (Pot: 995,000)</p> <p>Reach: 1+ 59.6%, 3+ 41.1%, Ave</p>

Table 9.1 PESAP Programs implemented during 2010/11

	Target Group	Messages	Program Overview	Analysis
		<p>and a person trained in resuscitation</p> <ul style="list-style-type: none"> <li>• Wear protective clothing, including safety footwear and safety helmet</li> <li>• Have emergency contact numbers on site</li> <li>• Set up safety barriers, wear hats and warning lights to reduce the risk of injury to the general public.</li> <li>• Comply with all WorkCover requirements and codes</li> <li>• Comply with all WorkCover requirements and codes</li> </ul>	<p>radio advertisements, 2 print advertisements, radio live reads and NRL rotating signage.</p> <ul style="list-style-type: none"> <li>• The campaign ran in 2 bursts – Aug/Sep 10 and Feb/Mar 11.</li> <li>• Radio is a key medium for this target group as it is present on building sites and in vehicles.</li> <li>• An underground cable safety message is included in our monthly radio safety campaign.</li> </ul>	<p>Freq:10x</p> <p>Market: Newcastle</p> <p>Target: M25-54 (Pot: 108,000)</p> <p>Reach: 1+ 72.3%, 3+ 53.2%, Ave Freq:11x</p> <p>Market: Central Coast</p> <p>Target: M25-54 (Pot: 57,100)</p> <p>Reach: 1+ 72.6%, 3+ 49.2%, Ave Freq:7.1x</p> <p><b>Press Reach and Frequency</b></p> <p>Potential: 87,000</p> <p>Reach: 1+ 36%, Ave Freq: 1.65x</p>
Electricity safety for school students	Children from Kindergarten to Year 10	<ul style="list-style-type: none"> <li>• Play in open spaces away from electricity poles, towers and powerlines</li> <li>• Stay away from electricity substations and power equipment</li> <li>• Never put a metal object in a toaster or power point</li> <li>• Know what to do in an emergency</li> <li>• Keep water away from electrical appliances and power cords</li> <li>• If you see a dangerous situation tell an adult</li> </ul>	<p><b>Electricity Safety Week</b></p> <p>Ausgrid provides registered primary schools with a pack containing electricity safety activities for Kindergarten to Year 6 students, prizes, posters, stickers and merit certificates.</p> <p><b>Stage 3 Electricity and Safety Unit</b></p> <p>Ausgrid developed a Stage 3 Electricity and Safety Unit and Electrical Resource Kit which aligns with best practice teaching principles and the NSW DET physical</p>	<p>95% of primary schools in Ausgrid's network area participated in Electricity Safety Week in 2010.</p> <p>The Electricity Unit and resource kits are provided to schools in Ausgrid's network area on request.</p>

Table 9.1 PESAP Programs implemented during 2010/11

	Target Group	Messages	Program Overview	Analysis
			<p>phenomena curriculum.</p> <p><b>High School Electricity Resource</b></p> <p>In conjunction with the Department of Education &amp; Technology, a microsite based on the science curriculum was developed and branded EnergyAustralia. The site provides students with the information they require to complete a mandatory science assignment on electricity</p>	<p>The microsite is currently being migrated to the Ausgrid website and promotion to schools will restart in Aug 2011.</p>
Substation and school holiday safety	Residents living within 1km of a zone substation	<ul style="list-style-type: none"> <li>• Don't enter a substation</li> <li>• Don't try to retrieve anything that has gone over a substation fence – call us and we'll get it for you</li> <li>• Call Ausgrid if you see anyone climbing over fences</li> <li>• Obey substation warning signs</li> <li>• Be aware of electrical dangers</li> </ul>	A safety postcard was developed to communicate with children warning them of the danger of entering a substation and asking them to call Ausgrid should a ball or other item go over the fence.	An unaddressed mailing was delivered to approximately 380,000 residences living within 1 km of identified zone substations during the Easter school holidays in 2011.
Do-it-Yourself (DIY)	Home renovators, home handymen, men aged 18-55 years	<ul style="list-style-type: none"> <li>• Don't mess with electricity – you're out of your league</li> <li>• Do-it-yourself (DIY) electrical work is not only dangerous, it's illegal.</li> <li>• Always contact a licensed electrical contractor</li> </ul>	<ul style="list-style-type: none"> <li>• The NRL continuous call partnership delivers a strong vehicle for an extended DIY Electrical Safety campaign with a broad reach to our target audience in Sydney, Central Coast, Newcastle and the Upper Hunter. The campaign includes live reads and pre-recorded advertisements.</li> <li>• Electricity safety</li> </ul>	<ul style="list-style-type: none"> <li>• Ratings in 2010 continue to dominate weekend listening with the CCT team reaching 256,000 listeners every weekend.</li> <li>• #1 share of overall listening by people 10+ continued to lead in 2010 at 20.9%</li> <li>• Dominating the commercial radio listening by Sydney's men with; 17%</li> </ul>

Table 9.1 PESAP Programs implemented during 2010/11

	Target Group	Messages	Program Overview	Analysis
			tips and online banners were also promoted as part of 2GBs Home Improvements Show from November 2009 to February 2010. <ul style="list-style-type: none"> <li>A DIY electrical safety message is included in our monthly radio safety campaign.</li> </ul>	share of all males 18+ 14.4% of men 18-54 years 13.9% of men 25-39 years
Storm Safety	General community	<ul style="list-style-type: none"> <li>Keep a battery-powered torch and radio handy</li> <li>Clear your yard of loose items and prune trees</li> <li>Unplug sensitive electrical devices</li> <li>Listen to your radio for power restoration updates and safety advice</li> <li>Be careful of electrical hazards hidden in storm debris</li> <li>Always assume fallen powerlines are live.</li> </ul>	Extended communications program with emphasis on ongoing preparedness messaging via Australian Traffic Network runs from November to March each year.	<ul style="list-style-type: none"> <li>A radio campaign was launched in November 2009 and continued until March 2010.</li> </ul>
Fallen Powerlines	General Community	<ul style="list-style-type: none"> <li>Assume fallen powerlines are live</li> <li>Stay well clear and contact Ausgrid on 13 13 88</li> </ul>	Covered in Ausgrid's Storm Safety and Electricity Safety for Students Campaigns.	Results from Ausgrid's Electrical Safety Survey 2010 showed a high understanding of dangers associated with fallen powerlines.
Christmas – People decorating their homes with festive lights	General Community	<ul style="list-style-type: none"> <li>Use lights and other electrical equipment designed for external use</li> <li>Check lights for damage before use</li> <li>Don't overload power points or boards</li> <li>Switch off lights overnight and when leaving the house.</li> </ul>	An extensive public relations campaign was supported by radio advertising which ran for two weeks in November and December 2010, the key Christmas decoration period.	<ul style="list-style-type: none"> <li>A media release was issued in December 2010</li> <li>Advertising runs late November and early December to coincide with seasonal risks.</li> </ul>
Bushfire Risk Management	Private Pole Owners	<ul style="list-style-type: none"> <li>If your property has private powerlines you have a legal obligation to ensure these powerlines and poles do not cause a fire or other hazard.</li> <li>Private pole owners are responsible for</li> </ul>	Ausgrid distributes bush fire risk management information which outlines customer's obligations regarding safety management of their electrical installations to	<ul style="list-style-type: none"> <li>Safety and Bushfire Prevention brochure sent to over 12,000 properties in bushfire designated zones in the</li> </ul>

Table 9.1 PESAP Programs implemented during 2010/11				
	Target Group	Messages	Program Overview	Analysis
		inspecting, testing and maintaining their powerlines regularly and making sure they are free of vegetation.	customers in our network area via direct mail, newspaper advertisements and the corporate website	<p>Hunter, Central Coast and North Sydney areas.</p> <ul style="list-style-type: none"> <li>• Tombstone style newspaper advertisements were included in all suburban and metro newspapers - coverage up to 1.4 million customers to meet the requirement for broad coverage across Ausgrid's network area.</li> <li>• Radio advertisements and live reads ran on regional stations</li> </ul>
Graffiti on electrical infrastructure	General Community	<ul style="list-style-type: none"> <li>• If you see graffiti on electrical infrastructure do not attempt to remove it, report it to Ausgrid.</li> </ul>	<p>Ausgrid developed a safety postcard to raise community awareness regarding the danger associated with removing graffiti from electrical equipment such as pillar boxes, kiosk subs etc. The postcard explains the risks and requests the community to report graffiti on electrical equipment via our Graffiti hotline, 13 15 35. Over 100,00 postcards were distributed in May and June 2010 to suburbs located in the Ausgrid</p>	<ul style="list-style-type: none"> <li>• 188,000 graffiti postcards were delivered to identified suburbs in Oct/Nov 10</li> <li>• An unaddressed mailing, which included a graffiti postcard, was delivered to approximately 380,000 residences living within 1 km of identified zone substations during the Easter school holidays in 2011.</li> </ul>

In addition to the programs and campaigns outlined in the 2010/11 Public Electrical Safety Awareness Plan program, Ausgrid undertook the additional programs outlined in Table 9.2 during the year.

**Table 9.2 – Additional PESAP Initiatives**

Additional Program	Description and Rationale
Ausgrid’s substation safety postcard campaign was extended to include a number of postcards focusing on electrical hazards including storm safety, DIY, general electrical safety and graffiti removal.	An unaddressed mailing was delivered to approximately 380,000 residences living within 1 km of identified zone substations during the Easter school holidays in 2011.

## 10. Power Line Crossings of Navigable Waterways

Electricity cables and wires which cross navigable waters can pose a safety hazard to the people who use the waterways. The most significant potential hazards are posed by live overhead electricity crossings. Masts, crane jibs, aerials and the like may contact the overhead electricity cables and anchors may become entangled with submarine cables. Such events may cause damage to the vessel, serious injury to the occupants and even death. Another consequence is damage to the electricity infrastructure and loss of supply.

**Table 10.1 Power Line Crossings of Navigable Waterways Summary**

	Existing (Number)	New (Number)	Incidents (Number)*	Crossings Reconstructed (Number)#	Crossings Identified as Requiring Conversion to Submarine Crossings (Number)
Overhead Crossings	277	0	2	0	0
Submarine Crossings	87	2	0	0	0

\* Description of incident to be given below.

# Description of the modification carried out including sign replacement to be given below.

### 10.1 Risk Assessment

Due to these inherent dangers NSW Maritime have introduced an electricity industry code “Crossings of NSW Navigable Waters”. This code was introduced in December 2008 and requires a risk management approach to the planning, installation, maintenance and modification of crossings. The aim of the risk assessment is to ensure that foreseeable risks associated with the crossing, particularly those to navigation safety, are as low as reasonably practicable and that the appropriate steps are taken to prevent fatalities and injuries to people and / or damage to property and interruption to the supply of electricity.

Ausgrid ensures that all new electricity crossings of navigable waterways include a risk management assessment, conducted to a standard equal or better than AS/NZW 4360:2004 – Risk Management. Where the risk assessment indicates that a proposed overhead crossing poses an ‘intolerable’ risk which cannot be removed, the crossing is redesigned as a submarine crossing.

Ausgrid has completed a full survey and risk assessment of all power line crossings of navigable waterways as required by the code. The results of the water crossing risk assessments is summarised in the table below:

Summary of the Power Line Water Crossings Survey and Risk Assessment				
Negligible	Medium Risk	High Risk	Extreme Risk	Total
198	0	17	30	245

Where the risk assessment of an existing crossing is ‘extreme’ or ‘high’ Ausgrid implements risk treatments to reduce the risk to an acceptable level. Appropriate treatments may include:

- Elimination of the need for a crossing (i.e. by re-routing cables);
- Relocating the crossing on the waterway;
- Reconfiguring the network;
- Installing a submarine crossing;
- Raising the height of the crossing;
- The use of signage;
- The use of coloured balls / and or coverings (tiger tails);
- Cable insulation;
- Lighting the signage associated with the crossing; and
- Other treatments as appropriate.

The following table outlines the timetable for Ausgrid's transition to full compliance with the new industry code for all existing overhead crossings and / or their signage.

Existing Crossing Assessment Timetable			
#	Situation	Treatments Required	Timetable for Completion
1	Reported incident has occurred at an overhead crossing	Analysis to determine an explanation for the incident and risk assessment to be completed. Risk level to be made as low as reasonably practicable through complying with overhead signage requirements and other treatments as necessary	Within three months of incident if incident occurs post implementation
2	All overhead crossings other than those in #1 above	Risk assessment to be completed	Completed
3	All overhead crossings for which risk assessment at #2 above indicates an 'intolerable' risk to navigation safety	Risk level to be made as low as reasonably practicable through complying with overhead signage requirements and other treatments as necessary	Within 2 years of the completion of the risk assessment.
4	All overhead crossings for which risk assessment at #3 above indicates an 'intolerable' risk to navigation safety	To be redeveloped as submarine crossings	Within first 15 year review period
5	All overhead crossings with signage which is not in accordance with this code by December 2010	Prepare and implement signage replacement plans based on risk assessment principles	Implement 10 year signage replacement plans

## 10.2 Ausgrid's Power Line Crossings

Ausgrid currently has a program of work underway to implement the required risk treatments identified in each risk assessment as required by the code. This program includes the design and implementation of the recommended risk treatments and the updating of existing warning signs to show the maximum vessel clearance heights, the installation of flood warning signage for waterways subject to flooding and advisory warning signs at all public launching sites within 5km of the water crossings.

In 2010/11 there were two incidents associated with waterway crossings, these incidents are listed below:

Summary of Incidents during 2010/11			
Date	Crossing	Location	Vessel Type
16/01/2011	EA136	Maianbar, Port Hacking	Yacht
3/04/2011	EA457	Hunter River, Maitland	Helicopter

The incident at Maianbar, Port Hacking involved a catamaran with a 17.9m mast hitting an 11kV crossing. There were warning signs located beneath the crossing on the northern and southern shores, the safe clearance shown on the signs was 8.6 m and 10.86 m respectively. Large marker balls were also present and located close the lowest point of the crossing. As a result of the incident investigation it has been recommended that this crossing be either raised to a minimum of 22m HAT or converted to a submarine crossing.

The incident at Maitland along the Hunter River involved a helicopter colliding with an overhead water crossing whilst attempting to land in a grassy area nearby. The crossing is located approximately 45 m downstream of the Belmore Bridge and was assessed to have a negligible risk rating. The risk assessment conducted was undertaken to evaluate the risk to water craft, not helicopters or other aircraft.

All incidents, including those involving power line crossings, are managed through Ausgrid's Incident Management System. Our Incident Management System details the requirement to notify NSW Maritime's relevant Regional Manager within 24 hours of any incident involving a vessel and a crossing and which results in fatality or serious injury to any person. This is in accordance with a protocol between Ausgrid and NSW Maritime for incident reporting and analysis.

Inspection and maintenance of Ausgrid's power line crossings, including waterway crossing signs and their associated support structures, is performed in accordance with Ausgrid's Network Maintenance Plan. The Plan describes the inspection and maintenance activities required on these assets, as determined by the Maintenance Requirements Analysis performed on the groups of assets. The resulting inspection and maintenance program developed for this group of assets is a combination of Patrols for Line Inspection, Pole and Steel Towers and Structures, base line examination of wood pole structures at all voltages, and vegetation management activities, and has been developed in accordance with industry best practice.

Typically the inspection patrols for line inspection and pole inspection are based on a four yearly inspection cycle. These two inspection programs are offset by five years and as a result the crossings are visited at a minimum of every 2.5 years +/- the latitude for the respective tasks. This is further enhanced by the Vegetation Management Program which is a full service program aimed at keeping vegetation at the required clearances at all times.

# 11. Managing Director Certification

Ausgrid

ELECTRICITY NETWORK PERFORMANCE REPORT 2010/11

## Declaration by Chief Executive Officer

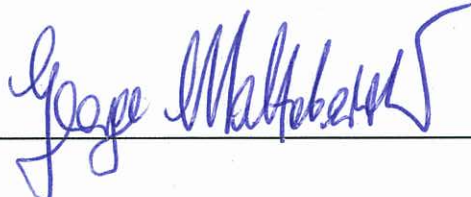
In submitting this Electricity Network Performance Report (the Report), I declare that the Report:

Complies with reporting requirements prescribed under the *Electricity Supply (Safety and Network Management) Regulation 2008*, and the "Distribution Network Service Provider Annual Report Outline" (the Outline), as provided by DTIRIS.

Has been checked in accordance with recognised quality procedures; and in my opinion, there are reasonable grounds to believe the data, and notes in respect of data contained in this Report, give a true and fair view of the organisation's performance in respect of the matters contained in the Outline.

NAME: George Maltabarow

SIGNATURE: \_\_\_\_\_



MANAGING DIRECTOR

DATE:

22/11/11

## Attachment A: Distribution Reliability of Supply: Definitions and Notes

Note 1: Where a distributor is unable to report in accordance with these definitions (e.g. estimating customer numbers interrupted where distributors' information systems do not provide connectivity data that links individual customers to the part of the physical network necessary to accurately calculate reliability measures), this must be noted in the annual report, together with a report on plans and expected timeframe to fix the problem. Where exact data is not available, estimates should be made together with the methodology for making estimates. Where appropriate, estimated reliability ranges could be provided.

Note 2: The following definitions and notes are in accordance with the 'Design, Reliability and Performance Licence Conditions' imposed on distributors by the Minister for Energy and Utilities on 1 August 2005 and revised in December 2007. The report outline is the implementation of this reporting framework, with some necessary additions, by I & I NSW for this annual Electricity Network Performance Report required under the Electricity Supply (Safety and Network Management) Regulation 2008.

A Distribution Network is a system of electricity lines and associated equipment at nominal voltages of up to and including 132kV, used for the distribution of electricity.

The distribution network generally ends where the service line connects to the customer's electrical installation. For an overhead service line, this is generally at the first connection on the customer's property. For an underground service line, this is generally at either the pit or pillar located near the property boundary or at the first connection on the customer's property. The distribution network for this purpose does not include the meter, service fuses or other service equipment on the customer's side of the consumer's terminals.

Note: A distribution network does not include assets operating as part of the South-East Australian interconnected transmission network.

A Distribution Customer means a metered entity who receives electricity supply at a point of connection from a distribution network and who has been assigned a unique National Metering Identifier (NMI) or an agreed point of supply otherwise. See note 3 below.

### Reliability Measures

Measure/description	Index	Definition
Total number of minutes a distribution network customer on average is without electricity / year	<b>SAIDI</b> System Average Interruption Duration Index	The sum of the duration of each sustained customer interruption (in minutes), divided by the total number of distribution customers. SAIDI excludes momentary interruptions.
Number of interruptions on average, a distribution network customer's supply is interrupted per year	<b>SAIFI</b> System Average Interruption Frequency Index	The total number of sustained customer interruptions, divided by the total number of distribution customers. SAIFI excludes momentary interruptions (one minute or less duration).

#### Notes

1. A customer interruption is any loss of electricity supply to a customer associated with an outage of any part of the electricity supply network of more than 0.5 seconds, including outages affecting a single premise. The customer interruption starts when recorded by equipment such as SCADA or, where such equipment does not exist, at the time of the first customer call relating to the network outage. An interruption may be planned or unplanned. Each individual customer interruption is assigned to the high voltage feeder that carries the supply of electricity to that customer.
2. The number of distribution customers is calculated as the average of the number of customers at the beginning of the reporting period and the number of customers at the end of the reporting period.
3. Un-metered Street Lighting supplies are excluded. Inactive accounts are excluded.

## Reliability Data Sets – Sustained Interruptions

Title	Data Set
Overall interruptions	All sustained interruptions including transmission, directed load shedding, planned and unplanned.
Planned interruptions only	Excludes: <ul style="list-style-type: none"> <li>• Transmission outages, and</li> <li>• directed load shedding.</li> </ul>
Unplanned interruptions	
Normalised	Further excludes those outages which are defined as 'excluded interruptions'.

### Notes

1. Distribution network interruptions are disaggregated into planned and unplanned interruptions. Planned interruptions are those for which the required notice has or should have been given.
2. Normalised interruptions are calculated by subtracting allowable excluded interruptions from unplanned interruptions.
3. Details of all events which result in excluded interruptions, including the overall SAIDI impact (distribution unplanned), are to be reported.
4. Sustained Interruption means an *interruption* of a duration in excess of one minute.
5. The following types of *interruptions* (and no others) are *excluded interruptions*:
  - (a) an *interruption* of a duration of one minute or less
  - (b) an *interruption* resulting from:
    - (i) load shedding due to a shortfall in generation
    - (ii) a direction or other instrument issued under the National Electricity Law, Energy and Utilities Administration Act 1987, the Essential Services Act 1988 or the State Emergency and Rescue Management Act 1989 to interrupt the supply of electricity
    - (iii) automatic shedding of load under the control of under-frequency relays following the occurrence of a power system under-frequency condition described in the *Power System Security and Reliability Standards* made under the National Electricity Rules
    - (iv) a failure of the shared *transmission system*
  - (c) a planned interruption
  - (d) any *interruption* to the supply of electricity on a licence holder's distribution system which commences on a *major event day*
  - (e) an *interruption* caused by a customer's electrical installation or failure of that electrical installation.

### 6. Major Event Day

The following material is reprinted with permission from IEEE Std. 1366-2003, *IEEE for Electric Power Distribution Reliability Indices*, by IEEE. The IEEE disclaims any responsibility or liability resulting from the placement and use in the described manner.

## Explanation and Purpose

The following process ("Beta Method") is used to identify *major event days* which are to be excluded from the *reliability standards* and *individual feeder standards*.

Its purpose is to allow major events to be studied separately from daily operation, and in the process, to better reveal trends in a daily operation that would be hidden by the large statistical effect of major events.

A *major event day* under the Beta Method is one in which the daily total system (i.e. not on a *feeder type basis*) SAIDI value ("daily SAIDI value") exceeds a threshold value, TMED. The SAIDI is used as the basis of determining whether a day is a *major event day* since it leads to consistent results regardless of utility size and because SAIDI is a good indicator of operational and design stress.

In calculating the daily total system SAIDI, any *interruption* that spans multiple days is deemed to accrue on the day on which *the interruption* begins. That is, all minutes without supply resulting from an *interruption* beginning on a *major event day* are deemed to have occurred in the *major event day*, including those minutes without supply occurring on following days.

## Determining a major event day

The *major event day* identification threshold value  $T_{MED}$  is calculated at the end of each *financial year* for each *distributor* for use during the next *financial year* as follows:

- a) Collect daily SAIDI values (Exclude transmission and directed load shedding but include planned outages.) for the last five *financial years*. If fewer than five years of historical data are available, use all available historical data for the lesser period.
- b) Only those days that have a daily SAIDI value will be used to calculate the TMED (i.e. days that did not have any *interruptions* are not included).
- c) Take the natural logarithm (ln) of each daily SAIDI value in the data set.
- d) Find  $\alpha$  (Alpha), the average of the logarithms (also known as the log-average) of the data set.
- e) Find  $\beta$  (Beta), the standard deviation of the logarithms (also known as the log-standard deviation) of the data set.
- f) Complete the major event day threshold  $T_{MED}$  using the following equation:
- g)  $T_{MED} = e^{(\alpha + 2.5\beta)}$
- h) Any day with daily SAIDI value greater than the threshold value TMED which occurs during the subsequent *financial year* is classified as a *major event day*.

## Treatment of a major event day

To avoid doubt, a *major event day* and all *interruptions* beginning on that day, are excluded from the calculation of a *distributor's SAIDI* and *SAIFI* in respect of all of its *feeder types*.

## Feeder Classifications

Feeder category	Description
CBD	A feeder supplying predominantly commercial, high-rise buildings, supplied by a predominantly underground distribution network containing significant interconnection and redundancy when compared to urban areas.
Urban	A feeder, which is not a CBD feeder, with actual maximum demand over the reporting period per total feeder route length greater than 0.3 MVA/km.
Short Rural	A feeder which is not a CBD or Urban feeder with total feeder route length less than 200 km.
Long Rural	A feeder which is not a CBD or Urban feeder with total feeder route length greater than 200 km.

Notes:

Short Rural feeders may include feeders in urban areas with low load densities.

Back up feeders should be given the same classification as the normal supply feeder.

## Attachment B: Transmission Reliability: Network Indices

A Transmission Network is a system of electricity lines and associated equipment operating at nominal voltages of 220 kV and above plus:

any part of a network operating at nominal voltages between 66 kV and 220 kV that operates in parallel to and provides support to the higher voltage transmission network

any part of a network operating at nominal voltages between 66 kV and 220 kV that is not referred to in paragraph (a) but is deemed by the AER to be part of the transmission network.

Indices:

- **Transmission Circuit Availability (%):**

Transmission circuit availability is measured as a percentage of the total possible circuit hours that would be available if no outages of circuits occurred.

$$\% \text{ Availability} = 1 - \frac{\text{Sum (Number of transmission circuit outage hours)}}{\text{Total possible circuit hours available}}$$

*Circuits* include regulated overhead lines and underground transmission cables.

*Number of transmission circuit outage hours* means in relation to each circuit, the number of hours during each reporting period in which a circuit was unavailable because of planned, un-planned, forced and emergency outages.

*Total possible circuit hours available* is the number of circuits multiplied by 8760 hours.

- **System Reliability (Un-Planned Off Supply Event Numbers):**

System reliability is measured by numbers of off supply events, either as:

Measure A: Number of events per annum greater than 0.05 up to 0.40 *system minutes*; and

Measure B: Number of events per annum greater than 0.40 system minutes;

OR

Measure C: Total number of events per annum.

$$\text{System minutes} = \frac{\text{(Total MWh unsupplied} \times 60)}{\text{MW peak demand}}$$

*MWh unsupplied* is the energy not supplied during the 'off supply' period.

Where restoration or loss of supply is multi-staged, the total MWh unsupplied is the sum of MWh unsupplied over the various stages until restoration of full supply.

*MW peak demand* means the maximum aggregated electricity demand recorded at entry points to the TransGrid transmission network and interconnector connection points during the year.

Note: 1. TransGrid will report Measures A & B  
2. Ausgrid will report Measure C.

- **Outage (Un-Planned) Duration Average (Minutes)**

$$\text{Measure} = \frac{\text{Aggregate minutes duration of all unplanned plant outages}}{\text{Number of unplanned plant outage events}}$$

The summation of all the unplanned outage duration times for the reporting period, divided by the number of unplanned plant outage events during the period, where:

Outage duration time for an item of plant starts when an outage occurs and ends when TransGrid either returns the item to service or the item is repaired, switching instructions are completed and the item is ready for energisation.

- **Unplanned Off Supply Events for Transmission Connection Points (Number and Duration)**

Operators are to provide a tabulated list of 'off supply' events.

Exclusions:

Outage data does not include transient outages of less than one minute; outages caused by a third party; force majeure events. Long duration outages are capped, Ausgrid at 14 days and TransGrid at 7 days.

Connection Point:

"The agreed point of supply established between Network Service Provider(s) and another Registered Participant, Non-Registered Customer or franchise customer."

- Note:
1. The definition for Connection Point is taken from the National Electricity Rules and the terms within the definition have the meanings defined in that Code.
  2. The connection points for the Ausgrid distribution network are not to be included.

## Attachment C: Safety

### Annual Reporting of Accidents and Incidents

The report (in accordance with this Outline and the accompanying tables) should summarise the number and type of electrical network accidents and incidents that have occurred during the year. The report should be a summary of reports already forwarded to the Department during the year and should indicate whether the injured persons or people placed at risk were network workers (employees or distributor contractors), accredited service providers or members of the public. The report should indicate the causes and contributory causes of the incidents; and for each cause, indicate the measures taken to prevent similar incidents occurring in the future.

Reporting is to generally follow the Department's Significant Electrical Network Incident (SENI) reporting arrangements which commenced on 1 July 2002. Terms are defined below.

### Serious Electricity Network Accidents (SENA)

A *serious electricity network accident* is an accident involving the electricity network (including accidents remote from the network but caused by the network e.g. network neutral failure affecting a customer installation etc.) as a consequence of which a person dies or suffers permanent disability, is hospitalised, receives treatment from a health care professional, or is unable to attend work for any period of time, but excluding situations where network support structures are impacted by motor vehicles and aircraft unless electricity is involved in the injury. The most common SENA are falls from heights.

This statistic also should include Serious Electricity Accidents, i.e. those where electricity was involved in the injuries.

These accidents are to be summarised and listed in Table 5.1 for accidents involving the public and Table 5.3 for network workers.

### Actionable Safety Incident (ASI)

An *actionable safety incident* is an incident, which is not a serious electricity network accident, involving the electricity network, but where there was a significant risk that a network worker, accredited service provider or member of the public could have been seriously injured as a result of the incident, and which meets any of the following criteria: the circumstances of the incident indicate that there is a duty of care to inform other distributors who may need to act to properly control a risk of serious injury (e.g. design defect in network equipment which may cause explosion or risk serious injury); or the risks indicated by the incident, and the probability of occurrence of the incident are such that, in order to properly manage the safety risks, the distributor needs to modify its network management plan (including public safety awareness plan) or any standards, procedures, systems or other documents required to be implemented under that plan; or contact is made, directly or indirectly, with the energised electricity network (e.g. crane hit overhead conductors, underground cable dig-in etc).

Situations where network support structures are impacted by motor vehicles and aircraft would not normally need to be reported unless criteria a) or b) are met. Incidents involving network assets, which place persons at risk of injury are to be summarised in Table 5.2 for incidents involving the public and Table 5.4 for incidents involving network workers and accredited service providers.

Reporting and analysis of these incidents is the key to the prevention of accidents by timely and appropriately targeted education, training and job or network redesign, where necessary.

## Attachment D: Definitions

### D1 Network Safety Context

**Accredited Service Provider:** A person contracted directly by a distribution customer to undertake contestable services, includes distributor employees or contractors carrying out contestable services.

**Contestable Service:** Means:

any service provided for the connection of customers to the *electricity network*, and  
any service comprising work relating to an extension of an *electricity network* or an increase in the capacity of an *electricity network*.

**Distributor:** Means the owner, controller or operator of an *electricity distribution network*.

**Distributor Contractor:** Means persons employed by contractors or sub-contractors engaged by a *Distributor* to carry out work for the *Distributor* in any capacity. Accredited service providers when contracted by the *distributor* to carry out network work shall be included in this category.

**Distributor Employee:** Means a person engaged by a *Distributor* under a contract of employment or apprenticeship. This may include permanent, part-time, casual or temporary staff.

**Network Worker:** Means persons employed or contracted by the *Distributor* (includes *Distributor Employees* and *Network Contractors*).

**Public:** Means persons other than Network Workers and Accredited Service Providers.

### D2 Customer Installations Context

**Audit** is defined as a review of the distributor's system of ensuring compliance with Legislation, Standards and Service and Installation Rules, installations, installing contractors and inspectors, as a check on the operation of installation safety management systems.

**Major Safety Breach** in a customer's installation occurs when an inspection or test of an electrical installation by or for the distributor detects a serious departure from the SAA Wiring Rules presenting an immediate danger to life, health or property. At least one of the following would be present:

- Exposed live parts
- Earthing system defects
- Insufficient insulation resistance
- Overloaded equipment
- Inadequate protection
- Incorrect polarity
- Unsuitable equipment.

**Customer Installation Shock** is defined as any electric shock reported to the distributor as received by a person on a customer's premises and not involving the electricity supply network. Note: A shock received as a result of a faulty network neutral connection is to be reported as a Network Incident/Accident. Faulty neutral connections at the point of attachment or customer's switchboard are considered to not involve the electricity supply network and therefore should be included here.

**Inspection** is defined as being an especially careful examination by a person representing the distributor who has sufficient knowledge and experience. It may include testing where appropriate, of completed Authorised Work to ensure it complies with the Service and Installation Rules and the distributor's network standards and specifications. Inspections are generally carried out on an audit basis in accordance with the past performance results of the installing contractor.

## Attachment E: Feeders Which Exceeded Individual Feeder Standards

### CBD Feeder Category

Feeder Name	Location	Customer Count	km	Date of First Non-Compliance	SAIDI Present	SAIFI Present	SAIDI at First Non-Compliance	SAIFI at First Non-Compliance	Description of Non-Compliance and Reason	Remedial Actions Proposed or Taken Including Timetable
ZN263:PA35 37GHJ	DALLEY ST	264	Triplex	Mar-09	0.00	0.00	611.00	0.98	Duration over index	Performance Corrected
ZN263:PA33 34KLM	DALLEY ST	1039	Triplex	Sep-09	21.12	0.50	105.81	1.89	Duration over index	Performance Corrected
ZN3288:PA45 46KLM	CITY SOUTH	498	Triplex	Mar-10	0.00	0.00	837.34	0.97	Duration over index	Performance Corrected
ZN781:PA14ABC	CITY NORTH	159	Triplex	Jun-10	0.00	0.00	322.53	0.49	Duration over index	Performance Corrected
ZN781:PA13DEF	CITY NORTH	357	Triplex	Dec-10	0.00	0.00	100.52	0.47	Duration over index	Performance Corrected
ZN263:PA35 37ABC	DALLEY ST	456	Triplex	Mar-11	72.31	1.96	73.14	1.97	Frequency over index	Monitor

**Urban Feeder Category**

Feeder Name	Location	Customer Count	km	Date of First Non-Compliance	SAIDI Present	SAIFI Present	SAIDI at First Non-Compliance	SAIFI at First Non-Compliance	Description of Non-Compliance and Reason	Remedial Actions Proposed or Taken Including Timetable	Feeder Performance Investigation Results	Anticipated Completion date
ZN15004:PA1	NEWPORT	1621	5	Jun-07	459.28	7.81	506.32	8.73	Duration over index	Monitor		
ZN9037:PA2	MIRANDA	1597	9	Dec-07	493.27	4.66	325.62	4.00	Duration over index	Vegetation Report issued	Significant portion of this feeder is being undergrounded.	Dec-11
ZN7900:PA3	CAMPBELL ST	116	1	Mar-08	15.72	0.02	625.76	1.03	Duration over index	Performance Corrected		
ZN80:PA32	CHATSWOOD	2913	11	Dec-08	286.77	4.18	372.76	4.06	Duration over index	Reliability project completed.		
ZN15002:PA6	NARRABEEN	1605	12	Mar-09	501.26	7.28	432.83	3.08	Duration over index	Monitor	S/T outages	
ZN15011:PA10	BEACON HILL	1392	11	Jun-09	37.36	1.01	446.09	4.87	Duration over index	Performance Corrected		
ZN15001:PA16	BROOKVALE	561	4	Dec-09	86.31	1.08	296.63	6.06	Frequency over index	Performance Corrected		
ZN15001:PA18	BROOKVALE	1879	6	Dec-09	130.91	2.04	352.96	6.14	Duration over index	Performance Corrected		
218:7482	CHARLESTOWN 33	1633	12	Dec-09	23.17	0.09	87.83	4.10	Frequency over index	Performance Corrected		
ZN847:PA2	HORNSBY	1477	10	Dec-09	153.97	2.17	338.10	4.51	Frequency over index	Performance Corrected		
ZN1850:PA3	BASS HILL	1000	10	Mar-10	161.58	1.97	421.58	5.98	Duration over index	Performance Corrected		

Feeder Name	Location	Customer Count	km	Date of First Non-Compliance	SAIDI Present	SAIFI Present	SAIDI at First Non-Compliance	SAIFI at First Non-Compliance	Description of Non-Compliance and Reason	Remedial Actions Proposed or Taken Including Timetable	Feeder Performance Investigation Results	Anticipated Completion date
ZN15001:PA13	BROOKVALE	109	2	Mar-10	79.40	2.44	99.65	5.90	Frequency over index	Performance Corrected		
ZN3155:PA18	DOUBLE BAY	439	1	Mar-10	4.29	0.01	485.83	0.64	Duration over index	Performance Corrected		
ZN847:PA18	HORNSBY	1571	16	Mar-10	516.13	4.13	350.81	3.13	Duration over index	Capital Project issued to correct performance issues. Vegetation work complete.	Long gully crossings and vegetation issues.	Dec-11
ZN12650:PA3	WEST GOSFORD	1193	6	Mar-10	87.34	1.02	365.83	4.28	Duration over index	Performance Corrected		
ZN12650:PA8	WEST GOSFORD	170	3	Mar-10	0.00	0.00	381.02	2.79	Duration over index	Performance Corrected		
207:1752	ADAMSTOWN 33	1685	10	Jun-10	0.00	0.00	183.88	4.10	Frequency over index	Feeder no longer exists	Will not be included in future reports	
ZN12600:PA3	LISAROW	1399	10	Jun-10	152.74	2.06	146.92	4.99	Frequency over index	Performance Corrected		
ZN15010:PA1	CAREEL BAY	1387	9	Sep-10	427.37	6.00	249.68	5.04	Frequency over index	Monitor	Subtransmission outages	
ZN15010:PA11	CAREEL BAY	470	4	Sep-10	441.65	6.12	256.42	5.00	Frequency over index	Monitor	Subtransmission outages	
ZN15010:PA5	CAREEL BAY	868	5	Sep-10	469.16	6.15	284.21	5.11	Frequency over index	Monitor	Subtransmission outages	
ZN15010:PA7	CAREEL BAY	1937	7	Sep-10	588.06	7.08	301.20	5.14	Frequency over index	Monitor	Subtransmission outages	

Feeder Name	Location	Customer Count	km	Date of First Non-Compliance	SAIDI Present	SAIFI Present	SAIDI at First Non-Compliance	SAIFI at First Non-Compliance	Description of Non-Compliance and Reason	Remedial Actions Proposed or Taken Including Timetable	Feeder Performance Investigation Results	Anticipated Completion date
ZN5868:PA3	GORE HILL	9	1	Sep-10	59.68	0.69	568.33	2.22	Duration over index	Performance Corrected		
ZN12600:PA9	LISAROW	1655	13	Sep-10	217.78	2.78	286.45	5.00	Frequency over index	Performance Corrected		
ZN15004:PA3	NEWPORT	1557	7	Sep-10	415.63	7.19	197.53	4.99	Frequency over index	Monitor	Subtransmission system has been inspected and minor issues fixed.	
ZN15004:PA5	NEWPORT	1432	12	Sep-10	426.89	7.17	202.98	5.04	Frequency over index	Monitor	Subtransmission system has been inspected and minor issues fixed.	
ZN15004:PA9	NEWPORT	2610	10	Sep-10	514.87	8.00	266.33	5.53	Frequency over index	Monitor	Subtransmission system has been inspected and minor issues fixed.	
ZN12620:PA10	NORAVILLE	1079	11	Sep-10	509.84	5.04	424.42	4.11	Duration over index	Monitor	3 Subtransmission faults while system in radial for maintenance - now complete.	
ZN12620:PA13	NORAVILLE	411	6	Sep-10	395.04	3.01	396.67	4.00	Duration over index	Monitor	3 Subtransmission faults while system in radial for maintenance - now complete.	

Feeder Name	Location	Customer Count	km	Date of First Non-Compliance	SAIDI Present	SAIFI Present	SAIDI at First Non-Compliance	SAIFI at First Non-Compliance	Description of Non-Compliance and Reason	Remedial Actions Proposed or Taken Including Timetable	Feeder Performance Investigation Results	Anticipated Completion date
ZN12620:PA3	NORAVILLE	1050	5	Sep-10	532.52	5.34	483.51	4.07	Duration over index	Monitor	3 Subtransmission faults while system in radial for maintenance - now complete.	
ZN12620:PA7	NORAVILLE	2102	9	Sep-10	523.95	4.05	475.61	4.03	Duration over index	Monitor	3 Subtransmission faults while system in radial for maintenance - now complete.	
ZN2473:PA34	NORTH SYDNEY	169	1	Sep-10	508.66	1.65	526.72	1.70	Duration over index	Monitor	2 unrelated Transformer failures, one of which tripped the CB.	
ZN3154:PA11	ST IVES	721	7	Sep-10	0.24	0.00	339.30	4.00	Frequency over index	Performance Corrected		
ZN12650:PA14	WEST GOSFORD	472	7	Sep-10	75.53	0.99	293.37	4.69	Frequency over index	Performance Corrected		
ZN10999:PA4	KOGARAH	1949	8	Sep-10	259.76	2.92	401.36	4.04	Duration over index	Performance Corrected		
ZN15010:PA12	CAREEL BAY	88	0.1	Sep-10	421.14	6.00	247.57	4.98	Frequency over index	Monitor	Subtransmission outages	
ZN35800:PA2	BANKSTOWN	212	3	Dec-10	186.82	4.27	233.51	4.75	Frequency over index	Monitor	Feeder investigated.	
ZN35800:PA7	BANKSTOWN	11	1	Dec-10	202.32	1.96	393.91	4.09	Duration over index	Performance Corrected		

Feeder Name	Location	Customer Count	km	Date of First Non-Compliance	SAIDI Present	SAIFI Present	SAIDI at First Non-Compliance	SAIFI at First Non-Compliance	Description of Non-Compliance and Reason	Remedial Actions Proposed or Taken Including Timetable	Feeder Performance Investigation Results	Anticipated Completion date
ZN12690:PA7	BERKELEY VALE	697	15	Dec-10	610.59	6.37	736.84	7.66	Duration over index	Reliability Project and vegetation report issued.		Jun-12
ZN874:PA15	CONCORD	561	3	Dec-10	496.14	0.76	400.47	0.44	Duration over index	Monitor	Feeder investigated.	
ZN874:PA9	CONCORD	300	3	Dec-10	314.84	0.34	621.08	0.68	Duration over index	Performance Corrected		
ZN15006:PA13	DEE WHY WEST	1340	7	Dec-10	112.57	2.98	234.89	4.83	Frequency over index	Performance Corrected		
ZN3922:PA11	DRUMMOYNE	1529	12	Dec-10	262.72	3.62	453.39	6.12	Duration over index	Performance Corrected		
ZN3922:PA7	DRUMMOYNE	1871	6	Dec-10	251.85	4.10	221.46	4.04	Frequency over index	Monitor	Feeder investigated.	
503:48078	EAST MAITLAND 33	1578	9	Dec-10	148.73	1.15	347.44	4.14	Frequency over index	Performance Corrected		
ZN129:PA8	HUNTERS HILL	1369	8	Dec-10	520.55	4.84	391.85	3.74	Duration over index	Monitor	Feeder investigated.	
ZN12590:PA3	LAKE MUNMORAH	1491	15	Dec-10	609.02	4.77	360.78	3.78	Duration over index	Monitor	Feeder inspected. Vegetation management completed.	
ZN12600:PA11	LISAROW	847	7	Dec-10	239.13	2.11	248.31	4.15	Frequency over index	Performance Corrected		
ZN15014:PA19	MONA VALE	1974	11	Dec-10	498.57	6.15	724.34	9.24	Duration over index	Monitor	Subtransmission outages	

Feeder Name	Location	Customer Count	km	Date of First Non-Compliance	SAIDI Present	SAIFI Present	SAIDI at First Non-Compliance	SAIFI at First Non-Compliance	Description of Non-Compliance and Reason	Remedial Actions Proposed or Taken Including Timetable	Feeder Performance Investigation Results	Anticipated Completion date
ZN1114:PA10	NORTH RYDE	1647	8	Dec-10	437.37	6.28	281.14	4.83	Frequency over index	Monitor	Feeder investigated.	
ZN269:PA7	WAVERLEY	1333	4	Dec-10	295.19	0.79	377.80	0.91	Duration over index	Performance Corrected		
ZN12650:PA10	WEST GOSFORD	661	4	Dec-10	54.03	1.06	389.70	3.98	Duration over index	Performance Corrected		
ZN12650:PA17	WEST GOSFORD	2336	15	Dec-10	83.23	2.43	174.40	4.52	Frequency over index	Performance Corrected		
ZN12650:PA6	WEST GOSFORD	1795	19	Dec-10	533.83	7.86	250.21	4.49	Frequency over index	Reliability Project issued. Vegetation report issued.	Feeder investigated.	Dec-11
ZN12570:PA19	AVOCA	875	9	Mar-11	441.03	4.75	350.60	3.62	Duration over index	Monitor	Feeder investigated.	
ZN12570:PA9	AVOCA	1756	10	Mar-11	420.37	5.42	421.31	5.43	Duration over index	Monitor	Feeder investigated.	
203:8082	CARRINGTON 33	24	2	Mar-11	380.00	1.16	395.83	1.21	Duration over index	Monitor	Feeder investigated.	
203:8084	CARRINGTON 33	1386	9	Mar-11	456.98	3.11	459.13	3.13	Duration over index	Monitor	Feeder investigated.	
ZN3425:PA30	CASTLE COVE	1973	12	Mar-11	589.36	6.86	537.55	4.98	Duration over index	Feeder inspected, vegetation report issued	Vegetation management required	

Feeder Name	Location	Customer Count	km	Date of First Non-Compliance	SAIDI Present	SAIFI Present	SAIDI at First Non-Compliance	SAIFI at First Non-Compliance	Description of Non-Compliance and Reason	Remedial Actions Proposed or Taken Including Timetable	Feeder Performance Investigation Results	Anticipated Completion date
ZN847:PA1	HORNSBY	1202	11	Mar-11	628.17	8.59	555.04	7.07	Duration over index	Feeder inspected, reliability project issued.		Apr-12
ZN15009:PA 7	MANLY	1603	4	Mar-11	351.55	3.05	372.83	3.16	Duration over index	Feeder inspected, vegetation report issued	Vegetation management required	
ZN15014:PA 11	MONA VALE	1286	7	Mar-11	312.09	3.68	366.03	5.33	Duration over index	Performance Corrected		
ZN15014:PA 14	MONA VALE	827	13	Mar-11	481.82	5.17	434.40	4.83	Duration over index	Monitor	Subtransmission outages	
ZN15014:PA 5	MONA VALE	1216	8	Mar-11	226.54	2.99	240.85	4.05	Frequency over index	Performance Corrected		
ZN15014:PA 16	MONA VALE	1576	6	Mar-11	166.22	1.97	490.49	5.73	Duration over index	Performance Corrected		
ZN15014:PA 22	MONA VALE	858	6	Mar-11	434.98	4.61	419.49	4.57	Duration over index	Monitor	Subtransmission outages	
ZN10994:PA 48	MORTDALE	2025	8	Mar-11	697.55	7.75	622.14	5.74	Duration over index	Monitor	Feeder inspected. Vegetation management completed.	
ZN15002:PA 2	NARRABEEN	1200	11	Mar-11	217.72	4.28	334.45	5.28	Frequency over index	Monitor	Subtransmission outages	
ZN15002:PA 4	NARRABEEN	701	4	Mar-11	250.80	4.94	368.23	5.96	Duration over index	Monitor	Subtransmission outages	
ZN15002:PA 8	NARRABEEN	799	5	Mar-11	200.52	4.10	311.61	4.99	Frequency over index	Monitor	Subtransmission outages	

Feeder Name	Location	Customer Count	km	Date of First Non-Compliance	SAIDI Present	SAIFI Present	SAIDI at First Non-Compliance	SAIFI at First Non-Compliance	Description of Non-Compliance and Reason	Remedial Actions Proposed or Taken Including Timetable	Feeder Performance Investigation Results	Anticipated Completion date
ZN15002:PA9	NARRABEEN	15	0.1	Mar-11	186.00	4.00	303.00	5.00	Frequency over index	Monitor	Subtransmission outages	
ZN1114:PA21	NORTH RYDE	52	5	Mar-11	833.34	3.57	849.37	3.63	Duration over index	Monitor	Feeder investigated.	
ZN965:PA21	PENNANT HILLS	664	5	Mar-11	401.43	2.76	433.04	2.67	Duration over index	Feeder inspected, vegetation report issued	Vegetation management required	Dec-11
523:33509	SINGLETON NORTH 66	455	5	Mar-11	327.43	3.43	368.86	3.62	Duration over index	Performance Corrected		
ZN3154:PA5	ST IVES	1121	8	Mar-11	248.93	3.23	372.12	4.10	Duration over index	Performance Corrected		
235:2121	TARRO 33	22	5	Mar-11	218.09	1.00	542.09	2.00	Duration over index	Performance Corrected		
235:2728	TARRO 33	463	4	Mar-11	221.03	0.65	538.67	1.63	Duration over index	Performance Corrected		
ZN14144:PA2	WAMBERAL	334	3	Mar-11	153.05	2.40	457.35	7.12	Duration over index	Performance Corrected		
ZN15005:PA6	BELROSE	1377	11	Jun-11	384.62	5.47	384.62	5.47	Duration over index	Performance under review		
ZN711:PA16	BLACKWATTLE BAY	298	2	Jun-11	683.24	0.71	683.24	0.71	Duration over index	Performance under review		
ZN384:PA37	CAMPERDOWN	192	1	Jun-11	1065.97	0.88	1065.97	0.88	Duration over index	Performance under review		
ZN3155:PA30	DOUBLE BAY	193	2	Jun-11	366.76	1.08	366.76	1.08	Duration over index	Performance under review		

Feeder Name	Location	Customer Count	km	Date of First Non-Compliance	SAIDI Present	SAIFI Present	SAIDI at First Non-Compliance	SAIFI at First Non-Compliance	Description of Non-Compliance and Reason	Remedial Actions Proposed or Taken Including Timetable	Feeder Performance Investigation Results	Anticipated Completion date
ZN1648:PA1 1	ENFIELD	471	3	Jun-11	230.98	4.12	230.98	4.12	Frequency over index	Performance under review		
ZN129:PA19	HUNTERS HILL	1447	7	Jun-11	381.75	3.06	381.75	3.06	Duration over index	Performance under review		
ZN1193:PA1	LINDFIELD	1546	11	Jun-11	255.65	4.14	255.65	4.14	Frequency over index	Performance under review		
ZN15014:PA 12	MONA VALE	1804	20	Jun-11	385.46	2.79	385.46	2.79	Duration over index	Performance under review		
232:11457	NELSON BAY 33	2250	17	Jun-11	557.02	3.85	557.02	3.85	Duration over index	Performance under review		
ZN12620:PA 2	NORAVILLE	499	6	Jun-11	355.57	2.72	355.57	2.72	Duration over index	Performance under review		
ZN14143:PA 6	SOMERSBY	21	7	Jun-11	382.26	4.43	382.26	4.43	Duration over index	Performance under review		

**Short Rural Feeder Category**

Feeder Name	Location	Customer Count	km	Date of First Non-Compliance	SAIDI Present	SAIFI Present	SAIDI at First Non-Compliance	SAIFI at First Non-Compliance	Description of Non-Compliance and Reason	Remedial Actions Proposed or Taken Including Timetable	Feeder Performance Investigation Results	Anticipated Completion date
ZN12630:PA2	PEATS RIDGE	570	74	Jun-07	1212.79	6.40	2236.0	11.32	Duration over index	Project in construction	Project has been delayed	Jun-12
ZN12690:PA16	BERKELEY VALE	369	18	Mar-10	250.55	3.00	1294.91	11.78	Duration over index	Performance Corrected		
512:48049	BRANXTON 66	626	169	Mar-10	284.75	2.03	1035.08	2.99	Duration over index	Performance Corrected		

Feeder Name	Location	Customer Count	km	Date of First Non-Compliance	SAIDI Present	SAIFI Present	SAIDI at First Non-Compliance	SAIFI at First Non-Compliance	Description of Non-Compliance and Reason	Remedial Actions Proposed or Taken Including Timetable	Feeder Performance Investigation Results	Anticipated Completion date
ZN12630:PA1	PEATS RIDGE	95	16	Dec-10	1106.70	4.43	1252.39	6.12	Duration over index	Reliability Project Issued		Dec-11
ZN12630:PA5	PEATS RIDGE	288	32	Dec-10	1720.92	7.37	1103.07	7.53	Duration over index	Reliability Project Issued		Dec-11
ZN14143:PA17	SOMERSBY	753	69	Mar-11	1573.43	6.04	1587.3	6.38	Duration over index	Reliability Project being developed	Feeder inspected, vegetation report issued	
ZN15013:PA6	TERREY HILLS	220	9	Mar-11	902.81	8.24	1004.6	8.75	Duration over index	Reliability Project being developed	Feeder inspected, vegetation report issued	
ZN12590:PA6	LAKE MUNMORAH	1340	19.6	Jun-11	1081.88	7.46	1081.9	7.46	Duration over index	Performance under review		
516:48065	LEMINGTON 66	48	32.0	Jun-11	1136.85	6.31	1136.9	6.31	Duration over index	Performance under review		
231:8415	SALT ASH 33	824	42.2	Jun-11	1036.49	6.72	1036.5	6.72	Duration over index	Performance under review		
ZN14891:PA12	WYONG	697	72.4	Jun-11	1646.24	6.85	1646.2	6.85	Duration over index	Performance under review		

**Long Rural Feeder Category**

None.

## Attachment F: Sub-transmission Lines and Substations and Zone substations

Element including Location, Customer Numbers, Element Length/Capacity	Description of Non-Compliance and Reason	Proposed Remedial Actions and Timetable
Rose Bay 33/11kV Zone	Forecast to be non compliant in Winter 2011 under N-1 conditions	Addressed by new Rose Bay 132/11kV zone
Port Hacking 132/33kV STS	Forecast to be non compliant in Winter 2011 under N-1 conditions	Relieved by establishment of Engadine and Gwawley Bay 132/11kV zones
Enfield 33/11kV zone	Forecast to be non compliant in Summer 2010/11 and Winter 2011 under N-1 conditions	Transfer load at 11kV to Campsie zone initially and in long term by converting Enfield to 132/11kV zone
Homebush 132/33kV STS	Forecast to be non compliant in Summer 2010/11 under N-1 conditions	Installation of 3rd transformer at Homebush STS
Lidcombe 33/11kV zone	Forecast to be non compliant in Summer 2010/11 under N-1 conditions	New SOPA 132/11kV zone will add extra capacity in the area enabling 11kV load transfers
Dee Why West 33/11kV zone	Forecast to be non compliant in Winter 2011 under N-1 conditions	Transfer load at 11kV to Beacon Hill
Killarney 33/11kV zone	Forecast to be non compliant in Winter 2011 under N-1 conditions	Replacement of 33kV switchgear at Killarney zone
North Head 33/11kV zone	Forecast to be non compliant in Summer 2010/11 and Winter 2011 under N-1 conditions	Replacement of 33kV switchgear at North Head zone
Careel Bay 33/11kV zone	Forecast to be non compliant in Winter 2011 under N-1 conditions	Replacement of 11kV switchgear at Careel Bay zone
Newport 33/11kV zone	Forecast to be non compliant in Winter 2011 under N-1 conditions	Installation of 2nd CLC and splitting 11kV busbar at Newport zone
Lindfield 33/11kV zone	Forecast to be non compliant in Winter 2011 under N-1 conditions	Replacement of 33kV feeders to Lindfield zone
Tomago 132/33kV STS	Forecast to be non compliant in Summer 2010/11 under N-1 conditions	New indoor 33kV switchboard

Element including Location, Customer Numbers, Element Length/Capacity	Description of Non-Compliance and Reason	Proposed Remedial Actions and Timetable
Rathmines Temporary 132/11kV zone	Forecast to be non compliant in Summer 2010/11 under N conditions	Conversion to permanent 2-transformer 132/11kV zone and N-1 supply
East Maitland 33/11kV zone	Forecast to be non compliant in Summer 2010/11 under N-1 conditions	Replaced by new Metford 33/11kV zone
Telarah 33/11kV zone	Forecast to be non compliant in Summer 2010/11 under N-1 conditions	Transfer load at 11kV to Rutherford zone and new Maitland zone
66kV feeder 819 (2) (819 Tee To Hunters Hill)	Forecast to be non compliant in Summer 2010/11 under N conditions	FDR 819(2) constraint addressed by load transfer at 11kV to Top Ryde zone.
33kV feeder 645 (Canterbury To Dulwich Hill T3)	Forecast to be non compliant in Summer 2010/11 under N-1 conditions	Feeder 645 constraint addressed by load transfer at 11kV from Dulwich Hill to Marrickville
33kV feeder 639 (Canterbury To Enfield T1)	Forecast to be non compliant in Summer 2010/11 and Winter 2011 under N conditions	Feeder 639 constraint addressed by load transfer at 11kV from Enfield to Campsie
33kV feeder 640 (Canterbury To Enfield T2)	Forecast to be non compliant in Summer 2010/11 and Winter 2011 under N-1 conditions	Feeder 640 constraint addressed by load transfer at 11kV from Enfield to Campsie
33kV feeder 641 (Canterbury To Enfield T3)	Forecast to be non compliant in Summer 2010/11 and Winter 2011 under N conditions	Feeder 641 constraint addressed by load transfer at 11kV from Enfield to Campsie
33kV feeder 775 (Peakhurst to Rockdale)	Forecast to be non compliant in Summer 2010/11 under N-1 conditions	Feeder 775 constraint addressed by load transfer at 11kV from Rockdale to Kogarah
33kV feeder 462 (Surry Hill to Camperdown Tx3)	Forecast to be non compliant in Summer 2010/11 under N-1 conditions	Feeder 462 constraint addressed by conversion of Camperdown to 33/11kV zone and replacement of 33kV feeders.
33kV feeder 346 (Bunnerong North To Botany T1)	Forecast to be non compliant in Summer 2010/11 and Winter 2011 under N-1 conditions	Feeder 346 constraint addressed by load transfer from Botany to Matraville zone
33kV feeder 360 (Bunnerong North to Mascot Tx6)	Forecast to be non compliant in Summer 2010/11 under N conditions	Feeder 360 constraint to be addressed by balancing the load between the transformers and ultimately refurbishment of Mascot zone due to condition

Element including Location, Customer Numbers, Element Length/Capacity	Description of Non-Compliance and Reason	Proposed Remedial Actions and Timetable
		issues
33kV feeder 383 (Surry Hills STS To Surry Hills Tx1)	Forecast to be non compliant in Summer 2010/11 under N-1 conditions	Feeder 383 constraint addressed by balancing the loads between the transformers at Surry Hills zone
33kV feeder 396 (1) (Surry Hills STS to Paddington)	Forecast to be non compliant in Summer 2010/11 and Winter 2011 under N-1 conditions	Feeder 396 constraint addressed by load transfer from Rose Bay to Waverley zone and ultimately converting Rose Bay to 132/11kV zone
33kV feeder 396 (2) (Paddington to Waverley)	Forecast to be non compliant in Summer 2010/11 and Winter 2011 under N-1 conditions	Feeder 396 constraint addressed by load transfer from Rose Bay to Waverley zone and ultimately converting Rose Bay to 132/11kV zone
33kV feeder 478 (Waverley To Rose Bay T1)	Forecast to be non compliant in Summer 2010/11 and Winter 2011 under N-1 conditions	Feeder 396 constraint addressed by load transfer from Rose Bay to Waverley zone and ultimately converting Rose Bay to 132/11kV zone
33kV feeder 612 (Homebush To Five Dock T1)	Forecast to be non compliant in Winter 2011 under N-1 conditions	Feeder 612 constraint addressed by load transfer at 11kV to New Croydon zone
33kV feeder 602 (Homebush Sts-Lidcombe)	Forecast to be non compliant in Summer 2010/11 under N conditions	Feeder 602 constraint addressed by load transfer at 11kV to New SOPA zone via Flemington zone
33kV feeder 604 (Homebush Sts-Lidcombe)	Forecast to be non compliant in Summer 2010/11 under N conditions	Feeder 602 constraint addressed by load transfer at 11kV to New SOPA zone via Flemington zone
33kV feeder 605 (Homebush Sts-Lidcombe)	Forecast to be non compliant in Summer 2010/11 under N-1 conditions	Feeder 602 constraint addressed by load transfer at 11kV to New SOPA zone via Flemington zone
33kV feeder 606 (Homebush STS-Concord)	Forecast to be non compliant in Summer 2010/11 under N conditions	Feeder 606 constraint addressed by load transfer at 11kV from Concord to Homebush Bay zone
33kV feeder 607 (Homebush STS-Concord)	Forecast to be non compliant in Summer 2010/11 under N-1 conditions	Feeder 607 constraint addressed by load transfer at 11kV from Concord to Homebush Bay zone
33kV feeder 614 (Homebush STS-Auburn)	Forecast to be non compliant in Summer 2010/11 under N-1 conditions	Feeder 614 constraint addressed by load transfer at 11kV from Auburn to Homebush Bay and replacement of UG feeders at Auburn zone
33kV feeder 567 (Willoughby STS to North Sydney zone Tx3)	Forecast to be non compliant in Summer 2010/11 under N conditions	Feeder 567 constraint addressed by conversion of North Sydney to 132/11kV operation

Element including Location, Customer Numbers, Element Length/Capacity	Description of Non-Compliance and Reason	Proposed Remedial Actions and Timetable
33kV feeder 566 (Willoughby STS to North Sydney zone Tx2)	Forecast to be non compliant in Summer 2010/11 under N conditions	Feeder 566 constraint addressed by conversion of North Sydney to 132/11kV operation
33kV feeder 557 (Willoughby STS to North Sydney zone Tx1)	Forecast to be non compliant in Summer 2010/11 under N-1 conditions	Feeder 557 constraint addressed by conversion of North Sydney to 132/11kV operation
33kV feeder 574 (Willoughby To Gore Hill Tx 4)	Forecast to be non compliant in Summer 2010/11 under N-1 conditions	Feeder 571 and 574 overload resolved by balancing load within zone transformers and load transfer to RNSH Zone
33kV feeder 571 (Willoughby To Gore Hill Tx 1)	Forecast to be non compliant in Summer 2010/11 under N-1 conditions	Feeder 571 and 574 overload resolved by balancing load within zone transformers and load transfer to RNSH Zone
33kV feeder 565 (Willoughby STS to Crows Nest Tx2)	Forecast to be non compliant in Winter 2011 under N conditions	Feeder 565 constraint addressed by conversion of Crows Nest to 132/11kV zone
33kV feeder 562 (Willoughby STS to Crows Nest Tx1)	Forecast to be non compliant in Winter 2011 under N-1 conditions	Feeder 562 constraint addressed by conversion of Crows Nest to 132/11kV zone
33kV feeder 730 (Port Hacking-Jannali)	Forecast to be non compliant in Winter 2011 under N-1 conditions	Feeder 730 constraint addressed by upgrading the limiting feeder UG section
33kV feeder 534 (Kuringai To Lindfield Tx 1)	Forecast to be non compliant in Winter 2011 under N and N-1 conditions	Feeder 534, 535, 536/1 and 536/2 constraint addressed by 33kV cable replacement
33kV feeder 535 (Kuringai To Lindfield Tx 2)	Forecast to be non compliant in Winter 2011 under N-1 conditions	Feeder 534, 535, 536/1 and 536/2 constraint addressed by 33kV cable replacement
33kV feeder 536/1 (Kuringai To Gordon SRA)	Forecast to be non compliant in Winter 2011 under N and N-1 conditions	Feeder 534, 535, 536/1 and 536/2 constraint addressed by 33kV cable replacement
33kV feeder 536/2 (Gordon SRA To Lindfield Tx3)	Forecast to be non compliant in Winter 2011 under N and N-1 conditions	Feeder 534, 535, 536/1 and 536/2 constraint addressed by 33kV cable replacement
33kV feeder 744/1 (Munmorah BSP - 744tee Noraville/Lake Monmorah/Vales Point)	Forecast to be non compliant in Winter 2011 under N-1 conditions	Feeder 744/1 constraint addressed by conversion of Lake Munmorah to 132/11kV zone
33kV feeder KU1 (Kurri STS - Cessnock zone)	Forecast to be non compliant in Summer 2010/11 under N-1 conditions	Feeder KU1 constraint addressed by load transfers at 11kV from Cessnock to Nulkaba zone

Element including Location, Customer Numbers, Element Length/Capacity	Description of Non-Compliance and Reason	Proposed Remedial Actions and Timetable
33kV feeder 34099 (Thornton - Wallalong)	Forecast to be non compliant in Summer 2010/11 under N conditions	Feeder 34099 constraint addressed by transfer of load at 11kV from Wallalong to Brandy Hill 132/11kV zone substation
33kV feeder 3061 (Broadmeadow - New Lambton zones)	Forecast to be non compliant in Summer 2010/11 under N-1 conditions	Feeder 3061 constraint addressed by transfer of load at 11kV to proposed Broadmeadow 132/11kV substation
33kV feeder S06 (Warringah STS-Dee Why West)	Forecast to be non compliant in Winter 2011 under N-1 conditions	Feeder S06 constraint addressed by load transfer at 11kV from Dee Why West to Beacon Hill zone