



**Electricity Network
Performance Report**

NEW SOUTH WALES

2006-07

TABLE OF CONTENTS

- TABLE OF CONTENTS2
- INTRODUCTION.....3
- 1 PROFILE3
- 2 NETWORK MANAGEMENT5
 - 2.1 Overview.....5
 - 2.2 Audits.....5
 - 2.3 Independent Appraisal Process.....8
 - 2.4 Network Complaints8
- 3 NETWORK PLANNING.....10
 - 3.1 Overview.....10
 - 3.2 System Design Criteria (Reliability Planning Standards).....11
- 4 ASSET MANAGEMENT16
 - 4.1 Overview.....16
 - 4.2 Technical Service Standards.....18
 - 4.3 Transmission Reliability19
- 5 NETWORK SAFETY22
 - 5.1 Overview.....22
 - 5.2 Serious Electricity Network Accidents (Public)25
 - 5.3 Actionable Electricity Network Safety Incidents (Public).....25
 - 5.4 Serious Electricity Network Accidents (Network Worker)26
 - 5.5 Actionable Electricity Network Safety Incidents (Network Workers).....26
 - 5.6 Electricity Network Operator Lost Time Injury Data.....27
- 6 BUSH FIRE RISK MANAGEMENT28
 - 6.1 Bush Fire Risk Management Plan28
 - 6.2 Bush Fire Risk Management Performance.....28
 - 6.3 Audits.....29
 - 6.4 Preventative Programs29
 - 6.5 Proactive Programs29
 - 6.6 Aerial Laser Surveys30
- 7 PUBLIC ELECTRICAL SAFETY AWARENESS CAMPAIGN REPORT31
- ATTACHMENT A: Transmission Reliability: Network Indices32
- ATTACHMENT B: Safety34
- ATTACHMENT C: Definitions36
- ATTACHMENT D: Independent Appraisal Guidelines37
- ATTACHMENT E: CEO/Managing Director Declaration39

INTRODUCTION

This Electricity Network Performance Report has been prepared by TransGrid to fulfil the requirements of the Electricity Network Operator reporting regime and the Electricity Supply (Safety and Network Management) Regulation 2002. The enactment of Electricity Supply (Safety and Network Management) Regulation 2002 has superseded the Electricity Supply (Safety Plans) Regulation 1997.

Clause 7(5) of the Regulation specifically excludes the requirement for TransGrid to lodge a Customer Installation Safety Plan.

This report has been independently appraised in accordance with the requirements of the DWE Report Outline. The Appraisal Report confirmed that this Report is complete and that the data presented can be relied upon by the Department for carrying out performance analysis.

1 PROFILE

TransGrid is a State Government-owned corporation, which owns, operates, maintains and develops New South Wales' \$3.7 billion high voltage transmission network. TransGrid's 12,500km transmission lines power the NSW economy by linking cities and towns, mines, agriculture, business and industry. TransGrid is a world-class transmission network service company, providing a secure and reliable high voltage electricity network from generators to the state's distributor networks owned by EnergyAustralia, Integral Energy and Country Energy.

The system operates at voltage levels of 500, 330, 220 and 132kV. TransGrid's 82 substations and power station switchyards are located on land owned by TransGrid and the transmission lines of steel tower, concrete or wood pole construction are generally constructed on easements acquired across private or public land.

As part of a \$40 million annual maintenance spend, TransGrid has staff strategically based at locations throughout NSW in order to meet the day to day operation and maintenance requirements as well as being able to provide emergency response. The main administrative office is located at the corner of Park and Elizabeth Street Sydney. Field staff are co-ordinated from major depots located at the Metropolitan Centre in Western Sydney and at Newcastle, Tamworth, Orange, Wagga Wagga and Yass.

Table 1.1 – Network Operator Statistics		
	Number at end Previous Year	Number at end Current Year
Customer Numbers (Total)	13	11
Maximum Demand (Aggregated System MW)	13,292	13,458
Energy Delivered to Year End (GWh)	69,657	70,907
System Loss Factor (%)	3.5	2.8
High Voltage Overhead (km)	12,433	12,442
High Voltage Underground (km)	47	47
Substation (Number)	82	82
Substation - Distribution (Number)	-	-
Structure (Number)	22,068	22,068
Employees (Full Time Equivalent Number)	945	948
Contractors (Full Time Equivalent Number)	141	130

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

Figure 1.1 – Network Map

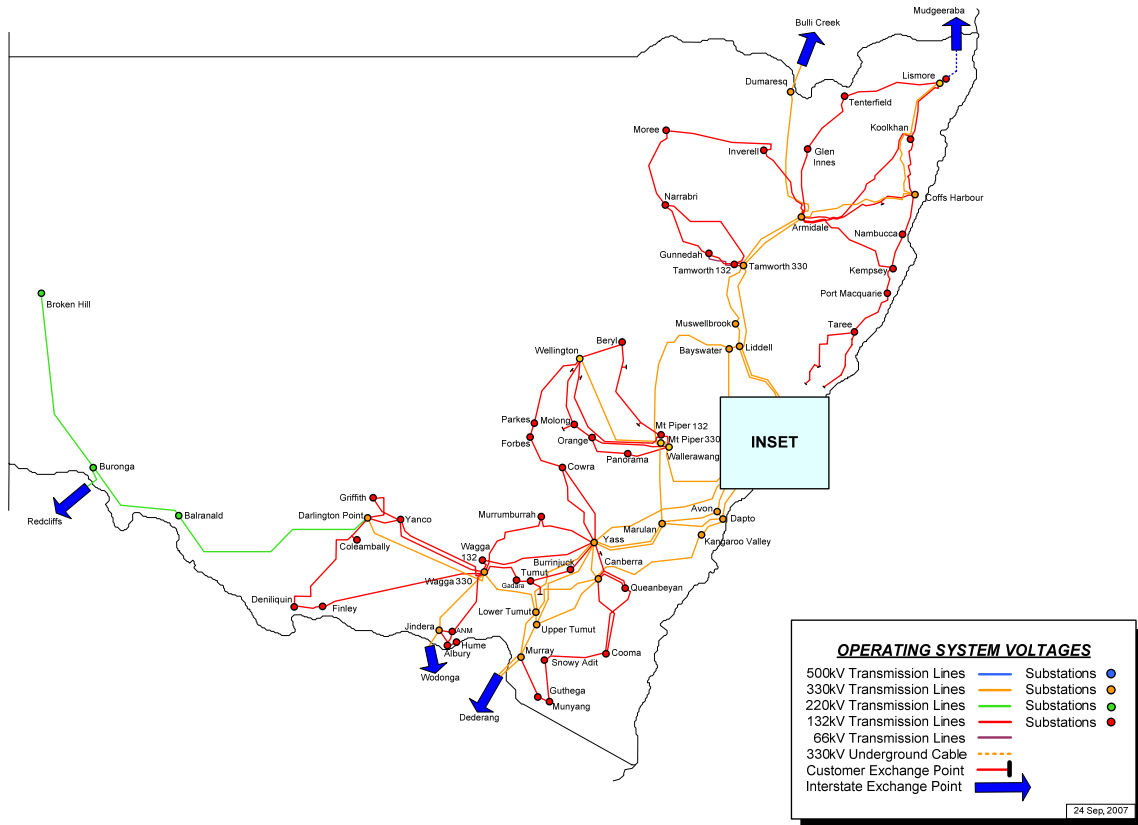
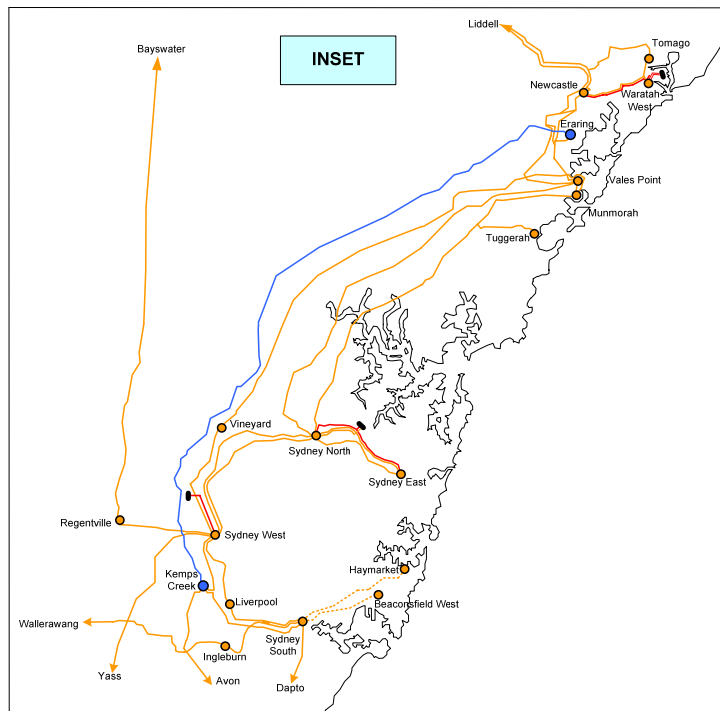


Figure 1.2 – Network Map Inset



2 NETWORK MANAGEMENT

2.1 Overview

TransGrid's vision is to be recognised as a world class electricity transmission company. It is committed to providing a safe working environment and ensuring the reliability of its electricity transmission network.

TransGrid published its updated (Five Year) Network Management Plan 2007-2011 in June 2006. This Plan provides a focus for ongoing analysis within TransGrid aimed at continually improving the management of the transmission system while also providing an authoritative vehicle for dissemination of information to TransGrid's managers, employees, customers and stakeholders.

TransGrid has also published a 30 Year Plan covering the period from 2005 to 2034. The 30 Year and Five Year Plans quantify TransGrid's medium and long term strategies for asset management and are used to determine budget forecasts.

Ongoing management strategies aimed at the achievement of TransGrid's mission are the maintenance and development of Asset Maintenance Policies and Strategies in the framework of an accredited Quality Documentation system, a system of Quarterly Asset Performance Reviews, regular Technical Performance Assessments and audits, and extensive benchmarking studies.

In accordance with the Electricity Supply (Safety and Network Management) Regulation 2002, TransGrid published the most recent revisions of its Public Electrical Safety Awareness Plan 2006-2009 in November 2006, Bush Fire Risk Management Plan 2005-2008 in March 2005 and Network Management Plan in June 2006.

2.2 Audits

TransGrid carries out Technical Performance Assessments and Technical Performance Reviews as compliance reviews within the business units that manage the electricity network. The internal audit program also routinely includes audits relating to the management of the electricity network; the implementation of, and compliance with, published plans and systems and procedures under those plans; and network performance reporting systems. With regard to the AER's performance incentive scheme TransGrid's submission and processes are audited at the end of each calendar year by the AER or a nominated consultant.

For all audits conducted within TransGrid, issues arising through audits are monitored through TransGrid's Issue Management System (IMS) on the TransGrid Intranet.

2.2.1 Technical Performance Assessments

Technical Performance Assessments are carried out annually on each Region to audit the technical standard and completeness of the maintenance performance. Independent internal auditors with specialist knowledge of the maintenance functions for different asset types conduct these assessments. A formal report detailing observations and business risks is prepared, with a follow-up process to ensure that any issues identified are effectively addressed. During the year, assessments were conducted at Northern Region/Tamworth (August 2006), Central Region/Orange (November 2006) and Southern Region/Yass (March 2007).

In 2006-2007 the assessments found that routine maintenance is being carried out in accordance with required timeframes, sites were kept in good condition, compliance with asset management strategies was good, and document control and record keeping is excellent.

2.2.2 Technical Performance Reviews

Technical Performance Reviews are carried out on several business functions within the Network Performance & Operations business unit each year. In 2006-2007 the following reviews were carried out:

- a review of congestion management in January 2007;
- an internal audit on NEM Rules and NEMMCO Operating Agreement was carried out by Corporate Risk & Audit, thus covering this TPR;
- an external audit on SCADA was carried out by KEMA. This covered the TPR scheduled for July 2007 on Operating Facilities; and
- 24 safety rules audits were completed at various sites.

The findings of these reviews were that:

- the process used for determination and advice of network capability appears to be well structured and documented;
- the procedure for the preparation of the weekly constraint report from constraints data is well defined;
- safety rules audits have found general compliance with TransGrid's safety rules and recommended some changes to TransGrid's refresher training process.

2.2.3 Internal Audits Relating to Management of the Electricity Network

During the 2006/07 period, Corporate Audit and Risk, the Group with responsibility for internal audit throughout TransGrid conducted a number of audits concerning the management of the electricity network. TransGrid uses a four level system to rate audit reports being:

- Green - the audited area/process complies with appropriate policies/procedures and control systems.
- Yellow - the audited area/process generally comply with appropriate policies/procedures and controls systems.
- Orange - the audited area/process were not always in compliance with appropriate policies/procedures and controls systems.
- Red - the audited area/process did not substantially have or comply with appropriate policies/procedures and control systems.

Further details of the audits are as follows.

Annual Planning Statement Process Report

This audit was conducted by TransGrid staff and completed in January 2007. The audit scope included the review of inputs, collation, preparation, production, distribution and general processes associated with the Annual Planning Report. The Scope of the audit expressly excluded a review or assessment of the adequacy, appropriateness or correctness of the technical content, data or information set out in the Annual Planning Report.

The process for the production of the Annual Planning Report was found to be sound and whilst reliant on key staff was operating effectively. It was considered that the process would be enhanced with the finalisation of procedures.

The audit report was rated Green.

Supervisory Control and Data Acquisition (SCADA)

This audit utilised the services of a specialised contractor, KEMA and was completed in May 2007. The audit looked at the functionality and application of SCADA including:

- coverage to sites;
- compliance with National Electricity Market Management Company (NEMMCO) Operating Agreement;
- documentation;
- updating of data; and
- information security.

The scope did not include disaster recovery which was covered by a separate audit in 2005-2006. The scope did not include the Remote Terminal Units located in substations or back up systems such as the Back-Up Alarm System (BAS). The scope did not include auditing of the end-to-end process between the substation automation system configuration and SCADA/EMS Configuration.

Overall it was considered that the functionality and application of SCADA is well managed. However there are some matters associated with the unavailability of SCADA to all sites and access security that are outstanding although plans are in place to address the matters.

The management and compliance of the NEMMCO Operating Agreement and the overall documentation was found to be effective.

The audit report was rated Yellow.

Technical Performance Assessment

This audit was conducted by TransGrid staff and was completed in September 2006.

Compliance reviews involve comparative assessments of practices against the audit process used by the Corporate Risk & Audit Group. Corporate Risk & Audit's practices follow the international standards set out by the Institute of Internal Auditors and are verified every three years by external review. In order to have consistency in the frameworks used within TransGrid, the basis for comparison is the International Auditing Standard.

The assessment covered practices used by the compliance function in the areas of:

- annual planning;
- assignment planning;
- assignment execution;
- documentation;
- executive reporting; and
- issues management.

As part of each review, Corporate Risk & Audit undertake an assessment against the International Auditing Standard. Where a suggested practice was not undertaken the impact of this was assessed on the overall result of the compliance activity. This standard was adopted

on the basis that decisions made as a result of assessed levels of compliance must be capable of external scrutiny (including supporting documentation).

Based on the scope and purpose of this review reliance can be placed on the Technical Performance Assessment process. However there are a number of matters that once addressed would enhance the level of reliance.

The audit report was Yellow.

2.2.4 Performance Incentive Scheme Audit

TransGrid is audited at the end of each calendar year by the AER or a nominated consultant with regard to its performance incentive submission and supporting processes. In 2006 SKM carried out the audit on behalf of the AER.

The outcome of the 2007 audit is that SKM is satisfied that the PI reporting system is free from material error. However, SKM has recommended some modifications to TransGrid's process:

- Automatically link the spreadsheets involved in the process to reduce the potential for human error.
- Include all TOS outages throughout the PI Reporting system and indicate which have been "included" or "excluded". SKM note that TransGrid had added an additional spreadsheet that identifies which outages have been "included" or "excluded", however this has not been integrated with the PI reporting system and is of limited assistance in its present guise.
- Undertake a sample check of the SCADA historian with the data stored in TOS to ensure all outage events are captured.
- Update recording procedures to state which of the PRI times are to be recorded in the TOS data base.

2.3 Independent Appraisal Process

This report has been subject to an independent appraisal carried out in accordance with Appendix D.

2.4 Network Complaints

TransGrid has a corporate Intranet-based system called the Incident Notification System. A sub-section of this system is for Customer Complaints. When a complaint is received either by personal contact, by phone or by mail, the recipient of the complaint creates a new record in the Complaints system and directs it to an appropriate officer. That officer then acts upon the complaint and records the details of any action and the outcome. When appropriate, the issue is then closed. The system allows for review of any complaints that have not been closed off in the required time.

TransGrid has an established process of contacting all property owners before entering their property to perform any type of work in maintaining transmission lines, easements and access tracks to explain the nature of the work to be done, so that all property owners' concerns may be addressed prior to commencement. During the year, each of TransGrid's Regions received a number of calls from property owners relating to this work. Most of these calls were enquiries about activities about to take place and the owners were satisfied with

information supplied by TransGrid officers. However, some required further discussion with property owners to clarify the situation and sometimes provide rectifying actions.

In its three regions for 2006-2007, nine notable verbal or written expressions of dissatisfaction were received. Of these:

- two were related to vegetation management;
- two were related to visual impact of new towers or fence;
- two were related to community impact during works on Cable 41; and
- three were related to noise of backup generators or security systems from TransGrid sites.

A complaint means a written or verbal expression of dissatisfaction about an action, a proposed action, or a failure to act by a network operator, its employees or contractors. This includes failure by network operators to observe their published or agreed practices or procedures. Enquiries should not be included.

Complaint Performance Data

Table 2.2 – Complaints Received Regarding Network Issues					
	Previous Years				Current Year
	02/03	03/04	04/05	05/06	06/07
Complaints Total	68	134	9	21	9
Complaints regarding Vegetation Management	4	6	1	3	2

3 NETWORK PLANNING

3.1 Overview

TransGrid is responsible for the planning and development of transmission networks in New South Wales in two interrelated roles.

Firstly it has been nominated by the NSW Minister for Energy to be the Jurisdictional Planning Body (JPB) for NSW. In this role it:

- represents the NSW Jurisdiction on NEMMCO's Inter-regional Planning Committee (IRPC);
- provides jurisdictional information to the IRPC to enable it to assist NEMMCO in producing its annual Statement of Opportunities (SOO) and Annual National Transmission Statement (ANTS); and
- carries out an Annual Planning Review, prepares an Annual Planning Report (APR) for NSW and reports to the Minister on matters arising from the Annual Planning Review, the SOO and ANTS.

Secondly it is registered with NEMMCO as a Transmission Network Service Provider (TNSP) in the NSW region of the National Electricity Market (NEM). The National Electricity Rules (the Rules) require TransGrid, as a TNSP, to:

- analyse the future operation of its transmission network to determine the extent of any future network constraints;
- conduct annual planning reviews with Distributors to determine the extent of any emerging constraints at points of connection between the TNSP's network and the Distributor's network and determine options for the relief of constraints;
- for each identified need co-ordinate a consultative process for consideration and economic analysis of network augmentation options in accordance with the AER's regulatory test and determine the recommended option;
- after resolution of any disputes concerning the recommended option arrange for its implementation in a timely manner; and
- prepare and publish an Annual Planning Report for NSW by June 30 of each year.

The Rules require the Annual Planning Report to include:

- load forecasts;
- results of annual planning reviews with Distributors;
- planning proposals for future connection points;
- forecast of constraints over one, three and five years;
- summary information for proposed augmentations; and
- consultation reports on proposed New Small Transmission Network Assets (NSTNAs).

These obligations are described more fully in Chapter 5.6 of the Rules and the AER's regulatory test.

In 2004, in accordance with a directive from the Ministerial Council on Energy, the Annual Planning Report's structure was aligned with the structure of the ANTS and Annual Planning

Reports in other NEM Jurisdictions. Thus in addition to the above the APR contains a summary of relevant National Transmission Flow Path (NTFP) developments.

To meet these obligations, TransGrid incorporates appropriate elements of the New South Wales Government's Total Asset Management (TAM) System regarding inter-agency plans and strategic planning (refer to Sections 3.3 and 3.5 of this report), service delivery strategy (refer to Section 3.2 of this report) and assessment and Decision Tools (refer to Section 3.4 – Demand Management – of this report.)

3.2 System Design Criteria (Reliability Planning Standards)

Under NSW legislation TransGrid has responsibilities that include planning for future NSW transmission needs, including interconnection with other networks.

In addition, as a TNSP in the NEM, TransGrid is obliged to meet the requirements of Schedule 5.1 of the Rules. In particular, TransGrid is obliged to meet the requirements of clause S 5.1.2.1:

“Network Service Providers must plan, design, maintain and operate their transmission networks ... to allow the transfer of power from generating units to Customers with all facilities or equipment associated with the power system in service and may be required by a Registered Participant under a connection agreement to continue to allow the transfer of power with certain facilities or plant associated with the power system out of service, whether or not accompanied by the occurrence of certain faults (called “credible contingency events”).

The Rules also set out the required processes for developing networks as well as minimum performance requirements of the network in a range of areas including:

- a definition of the minimum level of credible contingency events to be considered;
- the power transfer capability during the most critical single element outage. This can range from zero in the case of a single element supply to a portion of the normal power transfer capability;
- frequency variations;
- magnitude of power frequency voltages;
- voltage fluctuations;
- voltage harmonics;
- voltage unbalance;
- voltage stability;
- synchronous stability;
- damping of power system oscillations;
- fault clearance times;
- the need for two independent high speed protection systems;
- automatic reclosure of overhead transmission lines; and
- rating of transmission lines and equipment.

TransGrid consults with NEM participants and interested parties during the planning process and in determining proposals for network augmentations.

TransGrid's planning obligations are also interlinked with the licence obligations placed on Distribution Network Service Providers (DNSP) in NSW. TransGrid must ensure that the system is adequately planned to enable their licence requirements to be met.

In addition to meeting requirements imposed by the Rules, environmental legislation and other statutory instruments, TransGrid is expected by the NSW jurisdiction to plan and develop its transmission network on an "n-1" basis. That is, unless specifically agreed otherwise by TransGrid and the affected distribution network owner or major directly connected end-use customer, there will be no inadvertent loss of load (other than load which is interruptible or dispatchable) following an outage of a single circuit (a line or a cable) or transformer, during periods of forecast high load.

In fulfilling this obligation, TransGrid must recognise specific customer requirements as well as NEMMCO's role as system operator for the NEM. To accommodate this, the standard "n-1" approach can be modified in the following circumstances:

- Where agreed between TransGrid and a distribution network owner or major directly connected end-use customer, agreed levels of supply interruption can be accepted for particular single outages, before augmentation of the network is undertaken (for example radial supplies).
- Where requested by a distribution network owner or major directly connected end-use customer and agreed with TransGrid there will be no inadvertent loss of load (other than load which is interruptible or dispatchable) following an outage of a section of busbar or coincident outages of agreed combinations of two circuits, two transformers or a circuit and a transformer (for example supply to the inner metropolitan/CBD area).
- The main transmission network, which is operated by NEMMCO, should have sufficient capacity to accommodate NEMMCO's operating practices without inadvertent loss of load (other than load which is interruptible or dispatchable) or uneconomic constraints on the energy market. At present NEMMCO's operational practices include the re-dispatch of generation and ancillary services following a first contingency, such that within 30 minutes the system will again be "secure" in anticipation of the next critical credible contingency.

In 2005 DEUS introduced mandatory licence conditions on DNSPs which set out certain reliability standards for sub-transmission and distribution networks. The licence conditions specify "n-1, 1 minute" reliability standards for sub-transmission lines and zone substations supplying loads greater than or equal to specified minimums, eg 15 MVA in urban and non-urban areas. These conditions imply a requirement on TransGrid to provide a commensurate level of reliability in its network supplying NSW DNSPs.

Accordingly Country Energy has requested TransGrid to provide a commensurate reliability standard at connection points to its network, i.e. "n-1, 1 minute" reliability where Country Energy's maximum demand is greater than or equal to 15 MVA.

The jurisdictional requirements and other obligations described above also require the following to be observed in planning:

- At all times:
 - Electrical and thermal ratings of equipment will not be exceeded;
 - Stable control of system voltage will be maintained, with system voltages maintained within acceptable levels; and
 - Synchronous stability of the interconnected power system will be maintained.

- A quality of electricity supply at least to Rules requirements is to be provided;
- A standard of connection to individual customers determined by Connection Agreements is to be provided;
- As far as possible, connection of a customer is to have no adverse effect on other connected customers;
- Environmental constraints are to be satisfied;
- Acceptable safety standards are to be maintained; and
- The power system in NSW is to be developed at the lowest cost possible whilst meeting the constraints imposed by the above factors.

A further planning consideration is the provision of sufficient capability in the transmission network to allow components to be maintained in accordance with TransGrid's asset management strategies.

3.3 Demand Management

TransGrid is committed to consider Demand Management (DM) and other non-network alternatives such as embedded generation to address emerging constraints to meet its reliability obligations.

TransGrid treats non-network options on an equal footing with network options, and consideration of DM options is integrated into TransGrid's network planning processes.

For a demand management option to be implemented to meet a network constraint it must pass the AER's regulatory test, and have proponents who are committed to implement the network support solutions and are able to accept the contractual risks.

It is expected that DM options will emerge either from joint planning with distributors, or be proposed by NEM participants or other interested parties. Realistic DM options relating to Transmission Network Service may include, but are not limited to, combinations of the following initiatives that may lead to reduction in peak electricity consumption:

- tariff incentives;
- load interruption and reduction incentives;
- embedded generators; and
- power factor correction equipment.

TransGrid actively promotes DM options through:

- Identifying opportunities for DM options through joint planning with Distributors and engaging expert external consultants;
- Informing the market of constraints via its Annual Planning Report, publication of System Needs Papers and consultations for alleviating individual constraints;
- Participating, from time to time, in reviews of the Demand Management Code of Practice for Electricity Distributors in NSW;
- Participation in initiatives and reviews by the Department of Water and Energy (DWE) that include consideration of DM and its relationship to the development of electricity networks; and

- Joint sponsorship of DM projects, for example the installation of Pacific Solar's Crystalline Silicon on Glass photovoltaic system located at the Powerhouse Museum in Sydney.

DM options are implemented by third parties with relevant expertise and resources. Two Requests for Proposals (RFP) covering main system non-network alternatives were issued by TransGrid in the 2006/07 financial year. Proponents of relatively small capacity alternatives were encouraged to aggregate. Proposals were received for both embedded generation and load management projects.

The RFP for the West-Central West of the State, sought non-network alternatives to allow possible deferral of network augmentation works planned for the region—namely Wollar to Wellington 330kV and Manildra Parkes 132kV transmission lines. After thorough analysis of the proposals, it was concluded that none of the offers (or combination of offers) received, were capable of being implemented in the required timeframe, and/or would allow the cost effective deferral of the Wollar-Wellington 330kV line. The regulatory process for Manildra to Parkes project is to take place in late 2007 when it will provide an opportunity for a second round of non-network proposals.

The second RFP for non-network alternatives relating to the western 500kV transmission system upgrading drew responses from several companies proposing generation solutions as well as DSM initiatives. The RFP requested network support for 350MW in order to address two types of constraints – thermal line rating and voltage levels in the Newcastle/Sydney/Wollongong areas. In this instance, no one proponent was able to provide a cost effective network support solution required for summer 2008/09 – 350MW; however, a portfolio consisting of a number of proponents is under consideration.

Sydney CBD Demand Management Project

As part of the joint planning for electricity supply to the Sydney CBD and inner suburbs, TransGrid, Energy Australia and the Department Planning have initiated and are currently conducting a high priority project (Demand Management and Planning Project, DMPP) to implement a DM strategy to identify opportunities to reduce demand growth that may defer or avoid network expansion in the greater Sydney area. The project covers investigations and identification of feasible DM and local generation opportunities. TransGrid and EnergyAustralia are supporting the project by committing a total of \$10 million towards implementation by contributing \$1 million per year each over a five-year period.

The overall project structure in terms of funding is as follows:

- 30% Investigative works to identify DM opportunities to reduce demand;
- 60% "On the Ground" or demonstration peak reduction projects to actively reduce demand; and
- 10% Project management & administration: consultancy reports, public education, promotion and project administration.

A number of projects, such as identification and investigation for demand reduction in the St George / Sutherland, Sydney CBD, North Sydney, Inner West and East Sydney areas opportunities, have been completed. The final reports are published on the Demand Management and Planning project website (<http://www.planning.nsw.gov.au/dmpp/>). All completed reports are made available to the public through the project website.

Two major demonstration projects are currently being facilitated and financially supported. These cover the use of co-generation in three large commercial buildings in Sydney. The potential demand reduction anticipated for these sites is approximately 5MVA.

The total expenditure by TransGrid on the project at the end of June 2007 is \$3.5 million and the expenditure for 2006-2007 was \$1.5 million.

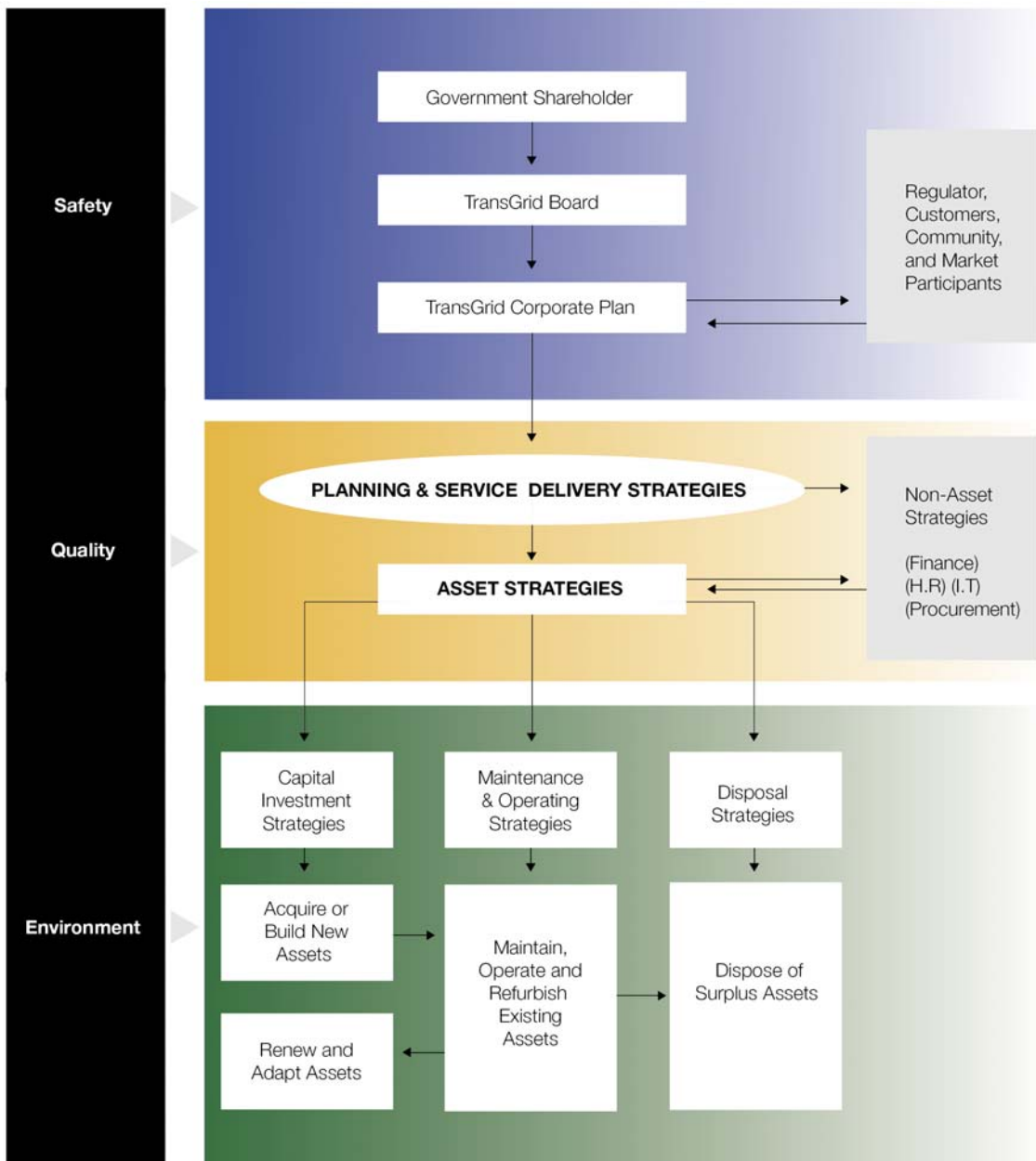
4 ASSET MANAGEMENT

4.1 Overview

TransGrid is constantly striving to optimise its asset management performance as a means of achieving its corporate vision “to be recognised as a world class electricity transmission company” and meeting its customers’ expectations of system reliability and quality of supply. This involves the development, maintenance and ongoing review of Asset Management Policies and Strategies for the maintenance, refurbishment and replacement of the full range of network assets.

To accomplish this mission, TransGrid has developed an Asset Management model that is based on the New South Wales Government’s Total Asset Management (TAM) Model as promulgated in 2001. TransGrid’s model is shown in Figure 4.1.

Figure 4.1



As a service delivery utility, TransGrid's approach is to apply the various elements of the TAM model, including strategies for Planning & Service Delivery, Assets, Capital Investment, Asset Maintenance and Asset Disposal, as well as the recommended implementation Plans for HR, IT, Procurement and the legislative, community and stakeholder forms of direction. In addition, TransGrid strives to meet its service delivery obligations as seen by its external Regulator in the form of Reliability and Availability while also meeting its corporate and community commitments to safety, the environment and quality.

To support this objective, TransGrid has initiated or maintained a number of strategies during the year:

- The review of maintenance policies and asset management strategies to implement the outcomes of Risk Management principles, identifying the criticality, reliability, risks and exposures associated with particular courses of action.
- Achievement of a consistently high standard of asset maintenance is facilitated by TransGrid's continued certification to ISO 9001 of its Quality Documentation system. Despite the large geographical distances between Regions and their assets, there is confidence in the effective application of identical policies across the network.
- Quarterly Asset Performance Reviews are conducted by maintenance, operating, asset management and design staff to specifically review the performance of the network assets during the previous three months. This involves the detailed analysis of all forced and emergency outages during the period, as well as a review of the long term availability and reliability trends to determine any issues requiring further investigation. Review meetings were held in September 2006, November 2006, February 2007 and May 2007.
- Technical Performance Assessments are carried out annually on each Region to audit the technical standard and completeness of the maintenance performance. Independent internal auditors with specialist knowledge of the maintenance functions for different asset types conduct these assessments. A formal report detailing observations and business risks is prepared, with a follow-up process to ensure that any issues identified are effectively addressed. During the year, assessments were conducted at Northern Region/Tamworth (August 2006), Central Region/Orange (November 2006) and Southern Region/Yass (March 2007).
- TransGrid's maintenance performance in the Australasian and International sphere is monitored through its regular participation in a number of benchmarking studies. ITOMS (International Transmission Operations & Maintenance Study) is a biennial study organised by a steering committee representing twenty six transmission organisations from Australasia, Europe, United Kingdom and United States and managed by the consulting group UMS. It compares at a detailed level the comparative costs of individual maintenance functions and their associated outage service levels. The results of these studies continue to provide insights into other best performer organisations' work practices. This information is fed back into TransGrid's reviews of its own practices and policies, completing the self-improvement cycle of asset management. During 2006/2007 TransGrid commenced participation in the ITOMS 2007 study for analysis of performance during the year 2006-2007.
- TransGrid implemented a Reliability Steering Committee to provide Executive oversight of all matters affecting network and system performance. The committee convenes on a quarterly basis and reviews the previous quarter's network performance in liaison with the Quarterly Asset Performance Review Working Group and System Planning and Performance Review Working Group with an overall aim of improving network reliability.

These and other asset management strategies which meet the TAM model are described in detail in TransGrid's Network Management Plan 2007-2011, as follows: Planning and Service Delivery (Section 3) and Asset Strategies (Section 4), including Capital Investment

Strategies (Section 4.1), Asset Maintenance and Operating Strategies (Section 4.2) and Asset Disposal Strategies (Section 4.4).

4.2 Technical Service Standards

TransGrid's prime service standards of customer focussed network performance are those of Reliability and Availability.

4.2.1 Reliability

A customer's perception of a network provider's reliability performance is based on how often the customer loses supply due to a temporary failure of TransGrid's plant. The less often or less severe any such losses, the better the perceived performance. The industry defines this reliability in 'system minutes'. Simply put, any loss of supply event can be described as the number of minutes that the total network would have to be down for at the network's annual maximum demand to equate to the amount of energy (MWh) that was not supplied. For example, in 2006/2007, one (1) system minute would have equated to 224.3 MWh.

For the current Revenue Reset period, the AER has implemented two reliability service standard measures that count the number of events where loss of supply either is greater than 0.05 but less than or equal to 0.4 system minutes (with a target of 5 or less), or the number that exceed 0.4 system minutes (with a target of 1 or less).

4.2.2 Availability

TransGrid's connected customers perceive the network's availability as its readiness to effectively transfer energy from the generators to the distributors. Simply put, it is a measure of the total time all transmission assets were in service compared to the theoretical ideal of all assets being in service for 100% of the time. It is impacted by the duration of planned outages for scheduled maintenance and capital construction or replacement programs as well as unscheduled outages from plant failures. Higher values of transmission availability may be achieved by minimisation of planned maintenance (through optimisation of maintenance policy) and more effective co-ordination of all planned outages, as well as improved maintenance practices to achieve fewer plant failures.

For the current Revenue Reset period, the AER has implemented availability targets as follows:

- Transmission Line Availability – 99.50%;
- Transformer Availability – 99.00%; and
- Reactive Plant Availability – 98.60%.

4.2.3 Average Outage Restoration Time

The average outage restoration time measures the time taken to return equipment to service after an unplanned (forced or emergency) outage. It is calculated by summing the durations of unplanned outages longer than one minute, and dividing by the number of those outages.

For the current Revenue Reset period, the AER has implemented an average outage restoration time target of 1500 minutes.

4.2.4 Quality of Supply

TransGrid addresses its obligations to quality of supply in a manner set out in Section 3.2 (Reliability Planning Standards) of this report and as required by Schedules S5.1a and S5.1 of the National Electricity Rules, covering:

- power frequency voltage;
- voltage fluctuations;
- voltage waveform distortion;
- voltage unbalance; and
- fault clearance times.

4.3 Transmission Performance

4.3.1 Reliability

For the year 2006-2007, TransGrid experienced 10 Energy not Supplied outages totalling 1.193 system minutes. When converted to a percentage of energy delivered, this equates to a reliability exceeding 99.999%. There was one incident with ENS greater than 0.05 system minutes and less than 0.4 system minutes, and one incident with ENS greater than 0.4 system minutes, compared to AER targets of five and one respectively.

4.3.2 Availability

For the year 2006/2007, TransGrid achieved availabilities of:

- Transmission Line Availability – 99.44%;
- Transformer Availability – 98.16%; and
- Reactive Plant Availability – 99.96%.

These represent the availability of transmission lines, transformers and reactive plant as reportable to the AER. The marginally below target values for transmission line and transformer availabilities were due mainly to a large quantity of capital work for transmission line pole replacements and transformer replacements during the year.

4.3.3 Connection Point Performance

Of TransGrid's 11 connected customers, six did not experience any unplanned outages causing loss of supply or interruption to generation. Two distribution customers, Integral Energy and Country Energy, experienced loss of supply from unplanned outages. Rail Corporation also experienced loss of supply from an unplanned outage. Two generator customers, Snowy Mountains Hydro Electric Authority and Delta Electricity, experienced interruption to generation.

The data provided in this section is determined in accordance with TransGrid's "Service Standards Reporting Policy – Attachment 1: Criteria for Inclusion and Exclusion of Outages for Performance Measures".

4.3.4 Transmission Reliability Performance Data

Transmission network indices and definitions are contained in Attachment A to this Outline.

Table 4.1 – Availability (%) Trend						
		Previous Years				Current Year
Parameter	Objective	02/03	03/04	04/05	05/06	06/07
Transmission Lines	99.50	99.64	99.65	99.59	99.47	99.44
Transformers	99.00	99.35	99.08	99.17	98.98	98.16
Reactive Plant	98.60	99.25	99.42	99.36	99.43	99.96

Note: 1. A measure of the circuit availability compared to the total if no outages had occurred.
2. Outages are required for maintenance purposes and major capital works, thus 100% is inherently unachievable. The decreasing transmission line and transformer availability in recent years in particular is due to TransGrid's augmentation and asset replacement capital works programs, and is not an indication of network reliability.

Table 4.2 – Network Reliability Trend						
		Previous Years				Current Year
Network Reliability (Off Supply Event Numbers)	Objective	02/03	03/04	04/05	05/06	06/07
No. > 0.05 but < 0.4 system minutes	5	5	4	1	3	1
No. > 0.4 system minutes	1	2	1	0	0	1

Table 4.3 – Outage (Un-Planned) Average Duration (Minutes) Trend						
		Previous Years				Current Year
Objective		02/03	03/04	04/05	05/06	06/07
1500		917	585	1037	944	570

Table 4.4 – Connection Point Interruptions (Unplanned) Current Year		
Connection Point	Number of Interruptions	Duration Total of Interruptions (Minutes)
Integral Energy		
Wallerawang 132 – 66kV Fdr 856 Oberon Tee Lilyvale	1	87
Wallerawang 132 – 66kV Fdr 857 Lithgow	1	75
Mt Piper 132 – 66kV Fdr 828 Portland	1	38
Country Energy		
Port Macquarie – 33kV Fdr 711 Laurieton tee Pumps	1	15
Port Macquarie – 33kV Fdr 712 Rocks Ferry	1	15
Kempsey – 33kV Fdr 4 Council (Munga)	2	174
Wellington – 132kV Fdr 94F Dubbo	1	29
Wellington – 132kV Fdr 94J Dubbo	1	28
Tumut – 66kV Fdr 828 Gundagai	1	50
Tumut – 66kV Fdr 827 Tumut	1	50
Tumut – 66kV Fdr 829 Tumut	1	50
Tumut – 66kV Fdr 848 Tumbarumba Tee Batlow	1	138
Tumut – 66kV Fdr 0850 Talbingo	1	50
Broken Hill – 22kV Fdr 5 Talc St	1	15
Broken Hill – 22kV Fdr 6 Talc St	1	15

Table 4.4 – Connection Point Interruptions (Unplanned) Current Year		
Connection Point	Number of Interruptions	Duration Total of Interruptions (Minutes)
Balranald – 22kV Fdr 1 Balranald	1	83
Yanco – 66kV Fdr 841 Narrandera	1	60
Yanco – 33kV Fdr 10 Kamarah	1	60
Rail Corporation		
Wallerawang 132 – 66kV Fdr 800 Railway	1	84
Snowy Mountains Hydro Electric Authority		
Guthega Power Station – No.1 Generator	2	1373
Upper Tumut – No.3 & No.4 Generators ³	1	-
Delta Electricity		
Wallerawang Power Station – No.8 Generator	1	2710

- Note:
1. This table provides a listing of customer connection points off supply events.
 2. Events included in this list may have been excluded from the data shown in Table 4.3.
 3. No.3 & No.4 Generators were providing reactive plant support at the time of trip, therefore this event did not interrupt generation.

Table 4.5 – Connection Point Numbers Current Year	
Number of Connection Points (Total Number)	419

5 NETWORK SAFETY

5.1 Overview

TransGrid's goal is zero injuries, occupational illnesses and incidents. Our first priority is the health and safety of our people, our contractors, visitors and the public. Our strategies are aimed at continually improving our performance and maintaining a major focus on risk management.

Our OHS Management System was certified to Australian Standard AS/NZS 4801 during the year and TransGrid also holds a self insurer licence for workers compensation.

TransGrid's OHS Management System is overseen by the Executive OHS Committee which is chaired by the Managing Director and made up of senior representatives from all business units. In addition, a number of strategies have been developed, implemented and monitored to ensure the system is effective and provides for continuous improvement:

- TransGrid Health and Safety Plan
- TransNet (intranet access for all employees);
- Schedule of compliance audits and inspections;
- Fit for Work Program
- Safety Improvement Program
- Safety Communications Steering Committee;
- Quarterly Health and Safety Themes;
- Chairman's Safety Award;
- Annual Safety Day – First Aid, Fire Fighting and Risk Assessment competitions;
- Presentations to TransGrid Board of every LTI by respective injured employee and/or their manager;
- Membership and participation in various industry committees, working groups and Field Days.

Executive Occupational Health and Safety Committee

The Executive Occupational Health and Safety Committee has responsibility for monitoring the implementation of the OHS management system. This includes over-seeing the development of corporate occupational health and safety policies and procedures and the promotion and monitoring of health and safety performance within TransGrid. A number of subcommittees have also been established under the Executive OHS Committee to address specific areas of TransGrid's activities. Reports from these subcommittees report to the Executive OHS Committee on a quarterly basis:

- Safety Rules
- Working At Heights
- High Voltage Safe Working Practices
- Fire Protection
- Electric & Magnetic Fields

- Clothing
- Safety Communications Steering

TransGrid Health and Safety Plan

This Plan sets out TransGrid's Objectives and targets for each year and is the basis for the development of business unit Health and Safety Action Plans. Progress reports on each business unit's Action Plan are reviewed by the Executive OHS Committee on a quarterly basis.

The OHS Objectives for 2006 – 2007 were:

- To provide a safe environment for the public; and
- To provide for the safety of our people.

TransNet (TransGrid's Intranet)

TransNet plays an important role in TransGrid's communication strategy. All policies, procedures, manuals, forms, etc are available to all employees electronically via TransNet. This system also provides other OHS information, including:

- Corporate Health and Safety Plan – objectives and targets;
- OHS Risk Management Database – including TransGrid's Hazard Register, Risk Management Plan, Work Activity and Workplace Risk Assessments, Work Method Statements, OHS Forms;
- Incident Notification System – all hazards, near misses and OHS incidents are notified electronically which facilitates immediate notification to relevant personnel;
- Approved Safety Equipment lists – details the Personal Protective Equipment that has been approved for use within TransGrid;
- Listings of First Aid Attendants, Injury Management Co-ordinators, OHS Committees (members, meeting dates, minutes);
- OHS Statistics;
- OHS Incident Management procedure; and
- Health and Safety Notice Board – includes Safety Alerts, Safety Bulletins and general notices, links to external OHS websites.

Schedule of Compliance Audits and Inspections

Compliance audits and inspections are scheduled and conducted to ensure that procedures are implemented in accordance with legislative and organisational requirements. These include OHS system audits (all TransGrid locations at least biannually), random, unannounced safety compliance inspections, site conformance inspections, contractor audits and team leader audits of pre-work risk assessments.

OHS Audit reports provided by internal and external auditors reflect a strong OHS commitment, understanding and performance across TransGrid.

Fit For Work Program

In addition to voluntary annual health assessments, TransGrid engaged two Occupational Therapists to work with the Health and Safety Team to develop and implement a Fit For

Work Program. This includes an assessment of the physical requirements of various work activities and the employees ability to safety undertake these tasks.

Safety Improvement Workshop

A Safety Improvement Workshop was conducted in consultation with our OHS Committee Chairpersons and other representatives from various classifications and locations. This resulted in a number of perceived problems being highlighted and addressed before they could manifest into more significant issues. A number of recommendations were developed by the participants and subsequently endorsed for implementation by the Executive OHS Committee.

Safety Communications Steering Committee

Communication is an integral component of our health and safety system aimed at ensuring that everyone is aware of their responsibilities and role in the implementation of our strategies.

The Safety Communications Steering Committee (comprising the General Manager/Business Services, Manager/Health and Safety, OHS Advisor and the seven elected OHS Committee Chairpersons) assists with the review of policy and procedures through consultation with local OHS committees. The Safety Communications Steering Committee also develops initiatives to promote health and safety to maintain a high level of awareness amongst staff and is responsible for developing and promoting the Quarterly Health and Safety Themes.

The Quarterly Health and Safety themes promoted throughout TransGrid during 2006-2007 included:

Quarter	Health Theme	Safety Theme
Winter	Eat Well, Stay Well	Think before you move
Spring	Men's Health	Good Housekeeping – everything in its place
Summer	Women's Health	Don't leave Safety @ Work
Autumn	Exercise – every little bit helps	Road safety – know the rules

Chairman's Safety Award

The annual Chairman's Safety Award recognises an individual or team who has made a significant contribution to safety in TransGrid throughout the year. The winners for 2006 were a tradesman and an Engineering Officer from Newcastle who designed and fabricated a prototype Portable Earthing trailer for use in switchyards. Their design has removed or minimised most of the manual handling risks associated with earthing and switching.

Annual Safety Day

TransGrid also holds an annual Safety Day with Risk Assessment, First Aid and Fire Fighting competitions for teams representing all areas of TransGrid. This was held at Newcastle in August 2006 with the overall Safety Day Shield being won by Yass.

Presentations of Lost Time Injuries to TransGrid Board

Employees who sustain a lost time injury are invited to attend a Board meeting with their manager to discuss the incident. This provides an avenue for the Board to gain a better understanding of the issues confronting our employees in the workplace, the root causes of

incidents and enables discussion on the corrective actions implemented to prevent any recurrences.

Participation in Industry Committees

TransGrid takes an active role in a number of industry committees and working groups (such as Energy Networks Association's Health, Safety and Environment Committee, WorkCover Industry Reference Group, DWE Industry Safety Steering Committee, etc.) to ensure that trends and expectations of legislators, industry and the community are understood and managed effectively. Compliance to these requirements was demonstrated by nil infringements or prosecutions and the renewal of TransGrid's workers compensation self insurer licence to 30 April 2010.

5.2 Serious Electricity Network Accidents (Public)

Initiatives are addressed in more detail under the Public Electrical Safety Awareness plan report.

Category	Previous Years				Current Year
	02/03	03/04	04/05	05/06	06/07
Non-Fatal	0	0	0	0	0
Fatal	0	0	0	0	0

Table 5.1 should also include accidents where electricity was involved in the injuries.

5.3 Actionable Electricity Network Safety Incidents (Public)

Category of Incident	Previous Years				Current Year
	02/03	03/04	04/05	05/06	06/07
Overhead Mains in Position					1
Overhead Mains Fallen	3				
Overhead Service in Position					
Overhead Service Fallen					
Underground Mains					
Underground Service					
Street Light Fitting or Support					
Cable Boxes, Pillars and Service Cabinets					
Substation (Excluding Pole-type) – Fire and/or Explosion	1				
Substation (Excluding Pole-type) - Other					
Substation (Pole-type) - Fire and/or Explosion					
Substation (Pole-type) - Other					
Poles Columns or Towers					
Air Break Switches					
Pole Mounted Equipment (Reclosers, Drop Out Fuses, etc)					
Service Connection or Customer Switchboard					
Other (Describe below)					

Total	4	0	0	0	1
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5.4 Serious Electricity Network Accidents (Network Worker)

Nil incidents for the year.

	Previous Years								Current Year	
	02/03		03/04		04/05		05/06		06/07	
	NF	F	NF	F	NF	F	NF	F	NF	F
Network Operator Employees	0	0	1	0	0	0	1	0	0	0
Network Operator Contractors	0	0	0	0	1	0	1	1	0	0

NF: Non Fatal F: Fatal

Table 5.3 should also include accidents where electricity was involved in the injuries.

5.5 Actionable Electricity Network Safety Incidents (Network Workers)

Nil incidents for the year.

Category of Incident	Previous Years				Current Year
	02/03	03/04	04/05	05/06	06/07
Overhead Mains in Position				1	
Overhead Mains Fallen					
Overhead Service in Position					
Overhead Service Fallen					
Underground Mains					
Underground Service					
Street Light Fitting or Support					
Cable Boxes, Pillars and Service Cabinets					
Substation (Excluding Pole-type) – Fire and/or Explosion	1		1		
Substation (Excluding Pole-type) - Other	2				
Substation (Pole-type) - Fire and/or Explosion					
Substation (Pole-type) - Other					
Poles Columns or Towers					
Air Break Switches					
Pole Mounted Equipment (Reclosers, Drop Out Fuses, etc)					
Service Connection or Customer Switchboard					
Other (Describe below)					
Total	3	0	1	1	0

5.6 Electricity Network Operator Lost Time Injury Data

TransGrid's OHS performance continues on a downward trend with 2006-2007 having the lowest annual Frequency and Average Lost Time Rates recorded at 1.6 and 2 respectively.

A number of new initiatives were introduced during the year with a proactive focus on prevention. The "Fit For Work" Program was launched for our field workers whose duties often involve higher risk activities.

TransGrid's OHS Management System was audited and certified to Australian Standard 4801 by SAI Global during the year. TransGrid also maintained our self insurer licence for workers compensation following successful WorkCover audits of our OHS Management System and our Claims Management and Injury Management processes.

As with other NSW Government agencies, TransGrid has adopted the "Working Together – Public Sector OHS & Injury Management Strategy 2005 - 2008" and is confident of achieving the targets set out in the strategy which align with the National Occupational Health and Safety Strategy.

Table 5.5 - Lost Time Injuries										
	Previous Years								Current Year	
	02/03		03/04		04/05		05/06		06/07	
Measure	E	C	E	C	E	C	E	C	E	C
Number of Network Workers (full-time equivalent)	956	22	974	89	961	71	942	141	948	130
Number of Lost Time Injuries	4	0	7	3	4	4	7	8	3	11
Number of Days Lost	29	0	130	101	63	76	228	506	6	52
Lost Time Injury Frequency Rate (LTIFR)	2.1	0	3.6	16.9	2.1	28	3.7	28.4	1.6	42.4
Average Time Lost (ATL)	7.3	0	18.6	33.7	15.8	19	32.6	63.2	2	4.7

E: Network Operator Employee

C: Network Operator Contractor.

6 BUSH FIRE RISK MANAGEMENT

6.1 Bush Fire Risk Management Plan

TransGrid's Bush Fire Risk Management Plan (revision 3) is published on TransGrid's website. The previous revision of the plan was subject to external audit and found to comply with the requirements of the Electricity Supply (Safety and Network Management) Regulation 2002 in relation to TransGrid's transmission network assets. Some minor improvements to the plan recommended in the audit report have been included in the current revision.

6.2 Bush Fire Risk Management Performance

6.2.1 Performance Indicators

TransGrid's network performed very well during the 2006-2007 reporting period, no bushfires were ignited by any of the high voltage assets. The following table summarises the performance outcomes, and compares these to the previous year's performance:

Indicator	2005/06		2006/07	
	Target	Actual	Target	Actual
Network assets inspected in bush fire prone areas	100%	100%	100%	100%
Outstanding network risk defects in bush fire prone areas	Nil	Nil	Nil	Nil
Fires where it appears ignition may have been caused by network assets	Nil	Nil	Nil	Nil

6.2.2 Performance Reviews

Formal reviews are carried out for all major incidents involving Network assets. These reviews are conducted under terms of reference set by the relevant General Manager or the Executive.

TransGrid has carried out reviews of the major bush fire emergencies that have impacted the NSW network in the last decade. These reports are:

- "Review of System Operation and Performance during the N.S.W. Bush Fire Emergency January 1994".
- "Review of Network Performance During Bush Fires in December 2001 – January 2003".
- "Investigation into the Impact of Bush Fires on TransGrid's Network" 4th-6th December 2002.

These reports covered:

- an assessment of system plant and performance;
- a review of operating practices, emergency response procedures, and design and maintenance standards; and
- the identification of strategies with respect to easement or site management to enhance reliability of the network in future or similar bush fires.

Generally the reports concluded that the network exhibited excellent performance during these emergencies. A number of improvements have been implemented as a result of these reviews, which will further enhance network reliability.

TransGrid classifies the transmission lines into high, medium and low inspection regimes. These classifications are based on a number of risk factors including factors such as vegetation regrowth rates and line condition that impact on bush fire risk. These are reviewed annually prior to setting the next year's inspection and maintenance requirements. Document GM AS L7 001 "Transmission Line Inspection Classifications" that lists these line classifications was reviewed in March 2006. The review required a change in classification to two lines however this was not related to any change in bush fire risk.

6.3 Audits

6.3.1 Report Recommendations for the Bush Fire Risk Management Plan

The previous revision of the Bush Fire Risk Management Plan (Revision 2) was audited as requested by the Director-General of the Ministry of Energy & Utilities (now known as Department of Water and Energy) by Denhine Holdings Pty Ltd and was found to comply with the Regulation in relation to TransGrid's transmission network assets (Audit Certificate issued on 28th October 2003). The improvement suggestions resulting from this audit were addressed in the previous reporting period.

6.3.2 Technical Performance Assessments

Technical Performances Assessments (TPAs) are undertaken annually in each of TransGrid's three Regions to audit maintenance and inspection compliance to TransGrid's policies. In 2006-2007 TPAs were undertaken in Northern Region (Tamworth Area), Central Region (Orange Area) and Southern Region (Yass Area). No bush fire risk non-compliance issues were identified by these TPAs.

6.4 Preventative Programs

TransGrid's preventative program is centered on its routine easement maintenance.

6.5 Proactive Programs

TransGrid provides representation to Bush Fire Management Committees as detailed in Attachment 1 of the Bush Fire Risk Management Plan. At these meetings TransGrid provides advice on matters such as the impact proposed hazard reduction burns will have on TransGrid lines and recommendations are made on how to protect these assets prior to the commencement of a burn.

TransGrid has also provided advice to the relevant BFMCs that TransGrid easements can be maintained, particularly in NPWS and State Forest managed estates, in a manner such that they can be utilised as Strategic Fire Advantage Zones (SFAZ). Some easements are now being managed in cooperation with these agencies to provide these zones.

Reference should also be made to TransGrid's Public Electrical Safety Awareness (PESA) plan that provides a strategy for the communication of the fire hazards associated with overhead power lines and vegetation and other electrical safety initiatives.

6.6 Aerial Laser Surveys

Recently TransGrid commenced a project to conduct Aerial Laser Surveys (ALS) of transmission lines for the purpose of obtaining accurate and up to date electronic data of these assets. It is only with the advent of this technology that it has been possible to accurately measure the as built profiles of such lines.

A recent survey has identified spans on a number of old transmission lines in southern NSW that have clearances to ground below those specified in the relevant Guideline, if they were operated at their maximum operating temperatures. The possible consequences of low clearances can include:

- flashovers to the ground tripping the line;
- flashovers to vegetation that can start a bushfire; and
- flashovers to vehicles or people under the line.

The lines on which low spans have been identified are:

- 8 Marulan – Dapto (330kV, commissioned 1962)
- 16 Marulan – Avon (330kV, commissioned 1962)
- 64 Lower Tumut – Upper Tumut (330kV, commissioned 1957, transferred from Snowy Hydro in 2002)
- 65 Upper Tumut – Murray (330kV, commissioned 1957, transferred from Snowy Hydro in 2002)
- 66 Murray – Lower Tumut (330kV, commissioned 1957, transferred from Snowy Hydro in 2002)

Note: Transmission lines 64, 65 and 66 which were constructed by Snowy Hydro in 1957 have been in service for more than 40 years. Since the transfer of these assets to TransGrid in 2002 there has been one flashover on 66 line which occurred when a conductor flashed over to a tree during high temperatures and extreme wind. The vegetation on the affected span has now been significantly reduced.

It is not considered appropriate to either turn off or de-rate the lines. Such action would place significant constraints on the operation of the network, particularly the connection of Snowy Hydro generation and interconnection with Victoria. The performance of these lines over the past 40 years would indicate that there is minimal risk in leaving these lines in service with their current ratings, providing all reasonable action is taken to mitigate the risk. Actions TransGrid is taking to mitigate the risk include replacement of insulators with alternative insulators, use of intermediate structures and switching off auto-reclose to reduce switching surge overvoltages.

Private property owners, National Parks and Wildlife Service, Snowy Hydro Limited and NEMMCO are being consulted in relation the operating issues and risk mitigation strategies.

7 PUBLIC ELECTRICAL SAFETY AWARENESS CAMPAIGN REPORT

TransGrid's current Public Electrical Safety Awareness Plan (PESAP) 2006-2009 was revised and approved on 7 November 2006. It is available to all employees on TransNet and to the public via TransGrid's external website. The PESAP is based on a risk assessment of public safety issues with regard to TransGrid's assets.

The 2006-2007 Action Plan for the implementation of the PESAP continued with the three specific focus areas from previous Plans: Relationship Management, Site Specific Issues and Community Interaction. Additional initiatives for this year included:

- upgrade of TransGrid Asset Management Information System (TAMIS) to manage the current listing of property owners and occupiers relevant to TransGrid's assets;
- update of listings and contact with relevant irrigation contractors, crop dusters and logging contractors within each Region;
- contact made with Police in each Region to advise of general safety and entry requirements for substations, and to offer briefings and inspections as appropriate;
- review of listing of substations identified with public electrical safety issues and updated according to agreed assessment criteria;
- new fencing installed at substations identified with increased risk of public safety;
- liaison with Waterways Authority and Australian Standards re signage requirements for navigable waters;
- advertisements placed in local newspapers throughout NSW promoting public safety on and around TransGrid assets.

The implementation of strategies is regularly reviewed by a working group of representatives from each Region and a report is provided to the Executive OHS Committee in May each year for review.

Random audits are conducted on all TransGrid substations at least once every two years to monitor safety conformance and identify any public safety issues. Identified issues are managed via reports to the relevant managers of the sites and recorded in the Issue Management System as appropriate.

The effectiveness of TransGrid's PESAP has been demonstrated by nil significant issues reported. The replacement of security fencing at substations identified with an increased public electrical safety exposure (such as signs of vandalism or unauthorised entry to substations) has significantly decreased incidents in those substations.

ATTACHMENT A: 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:

(a) 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; and

(b) 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. EnergyAustralia will report Measure C.

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

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, EnergyAustralia 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 EnergyAustralia distribution network are not to be included.

ATTACHMENT B: 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 network operator 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 or member of the public could have been seriously injured as a result of the incident, and meeting any of the following criteria:

- a) 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 control a risk of serious injury (e.g. design defect in network equipment which may cause explosion or risk serious injury); or
- b) 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; or
- c) 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.

Lost Time Injury Reports

A report in the format provided in the accompanying table (Table 5. 5) covering the parameters identified below is required for both network operator employees and network operator contractors.

Network Contractors must be required to report relevant OH & S data relating to their work for the network business as part of their contract. Calculation of the ESAA measures for this work may be done by either the contractor or the network operator.

Note: Where existing systems do not allow for reporting as required above, network operators must report as much as they are able for their own employees and for contractors, with explanatory information, while taking all reasonable steps to set up the required reporting system.

Reports are to be based on a 12-month period as at the end of June.

The parameters to be reported are:

- o Number of employees/contractors in equivalent person-years [Full-time employees are averaged from those recorded in the last payroll of each month in the year; Part-time employees are calculated in the same way except that for each month a pro-rata factor must be used to take into account the portion of the working week being worked by each part-time employee; Network contractors are calculated based on actual hours worked in the year and divided by 2000.];
- o Number of lost-time injuries;
- o Number of days lost;
- o Number of lost-time injuries/million hours worked (LTIFR). This is defined as the number of lost-time injuries/diseases per million hours worked. (2000 hours is used for each person-year.)
- o Average time lost.

ATTACHMENT C: Definitions

D1 Network Safety Context,

Network Operator: Means the owner, controller or operator of an electricity network

Network Operator Contractor: Means persons employed by contractors or sub-contractors engaged by a *Network Operator* to carry out work for the *Network Operator* in any capacity.

Network Operator Employee: Means a person engaged by a *Network Operator* 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 *Network Operator* (includes *Network Operator 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 network operator'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 deficiencies would be present:

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

Customer Installation Shock is defined as any electric shock reported to the Network Operator 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 network operator 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 network operator'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 D: Independent Appraisal Guidelines

D1 Introduction

The Network Performance Report must include an appraisal of the integrity of -

- o the information presented in the report; and

The appraisal is to be carried out by independent persons who are qualified to do so.

Integrity for the purposes of the appraisal means that the report is complete and that the data presented can be relied on by the Department for carrying out performance analysis.

D2 Purpose of the Guideline

The purpose of these guidelines is to ensure that appraisals are conducted in an independent, rigorous and consistent manner. To this end the guidelines establish minimum requirements for the independence and expertise of the appraisers, and for the conduct and reporting of the appraisals.

It is intended that the appraisal process will include consideration of all aspects of compliance with the report outline and definitions, as well as identification of any non-compliance and corrective action being taken to eliminate any non-compliance.

D3 Appointment of the Appraiser

The appraisal is to be carried out by a person who has been nominated by the network operator by notice in writing to the Director-General for review prior to appointment. Details of the proposed appraiser to be provided should include name, qualifications and experience and any other relevant information.

The nominated appraiser is to be a person who:

- o is independent of the network operator, and
- o is competent to exercise the functions of an appraiser under the Electricity Supply (Safety and Network Management) Regulation and this outline in respect of the Report.

D4 Pre-Appraisal Discussion

Following appointment of the appraiser and prior to the commencement of the appraisal the Department shall be given the opportunity of having a pre-appraisal interview with the appraiser. The interview provides an opportunity for DWE to indicate areas which may be of particular interest and for the appraiser to have clarified any issues which are unclear.

D5 Appraisal Report

The outcome of the appraisal process is to be an appraisal report signed by the Independent Appraiser, and confirming that their appraisal met the requirements of Attachment E of this outline. The appraisal report is to be lodged with the draft Network Performance Report by 30 September annually.

The appraisal report must provide an appraisal of the reliability, accuracy and integrity of information reported in accordance with this Outline and the basis for any views provided. In addition the report must include an analysis of the following:

- o the documented procedures for measuring, processing and reporting data, measurement systems, information systems and quality controls;
- o the extent to which relevant staff demonstrate an understanding of those documented procedures, measurement systems, information systems and quality controls;
- o evidence that those documented procedures, measurement systems, information systems and quality controls are being observed or properly implemented;
- o the extent to which any reported data has been estimated or extrapolated rather than measured directly, including an estimated reliability range for data where appropriate; and
- o the extent of involvement by senior management in the Network Performance Reporting process.
- o The status of projects planned to address the findings of the PB Associates Report on Distributors' Reliability Reporting, including progress to date, future plans and their timing, and the outcomes that the initiatives are expected to deliver.

The appraiser, as part of this process should review all data by comparing the data with previous years for consistency and also consider whether it meets generally expected results for the particular performance measure. In addition, sufficient data should be thoroughly checked, from its original measurement to its incorporation into the final report, on a sampling basis to generate confidence in the integrity of all data in the report.

ATTACHMENT E: CEO/Managing Director Declaration

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ELECTRICITY NETWORK PERFORMANCE REPORT 2006-2007

Declaration by Managing Director

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

1. complies with reporting requirements prescribed under Schedule 1 and the *Electricity Supply (Safety and Network Management) Regulation 2002*, and the "Network Operator Report Outline", as provided by DWE;
2. has been appraised by an independent appraiser in accordance with the "Appraisal Guidelines" contained in the "Network Operator Report Outline";
3. includes a copy of the appraisal, signed by the independent appraiser;
4. 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 "Network Operator Report Outline".

NAME: *KEVIN MURRAY*

SIGNATURE: 

MANAGING DIRECTOR

DATE: *29/4/07*