Measuring the resilience of a utility network

A case study

**Paper by energypeople and
Western Power Distribution**

energypeople

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September 2016

Document Properties

Title: WPD – Measuring the resilience of a utility network – a case study

Reference: ep/WPD/Sep '16

Issue: Final version (v1.0)

Date: 28 September 2016

Authorisation

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Alison Sleightholm	On behalf of WPD	

History

Issue	Date	Originator	Checker	Description
1.0	28 September 2016	Geoff Stott	Alison Sleightholm	Final version incorporating comments from WPD
0.1	12 September 2016	Geoff Stott	Simon Faiers and Bill Slegg	Draft version to WPD for comment
0.0	06 September 2016	Geoff Stott	-	Document created from energypeople's template

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1   Introduction

In February 2002, a study was commissioned by the former Department of Trade and Industry (DTI) into the resilience[1] of the UK transmission and distribution systems. Early considerations led to other matters being included in the study in addition to 'resilience'.

The underlying cause that drove the study was a publicly-expressed concern that the UK's privatised networks had been purchased by 'short-termists' at the expense of customer service and value.

The study, carried-out by a consortium which included two of the authors of this paper, was focused on two important and interrelated aspects - the measures that are in place to reduce the risk of a network emergency from major service interruptions and the ability to manage the restoration of service in the event of a major failure and/or widespread disruption.

At the request of Western Power Distribution (WPD), energypeople has prepared this current paper as a brief overview of the 2002 study.   By agreement with WPD, it includes the results specific to WPD's South Wales licensed area

Although the study was specific to the UK Electricity Supply Industry, the authors believe the principles can be applied to any utility sector.

2   Purpose of the 2002 study

The purpose of the 2002 study was to develop an understanding of the UK electricity transmission and distribution sector as a whole and its capability to respond to a major system emergency affecting critical installations and/or the interruption of electricity supplies to large numbers of customers. This was driven by the assertion from some quarters to Government that after 10 years of private ownership the long term good of electricity networks had been sacrificed for short term gain. Four interrelated themes were identified: preparedness, responsiveness, resilience and governance.

An important objective was to arrive at an overall assessment of the current state of the industry. However, the study was also designed to identify examples of good practice and, possibly, areas of inadequacy in emergency preparedness within the industry. The findings - if followed up by the companies (acting singly or collaboratively as appropriate), the DTI, and Ofgem - should help reduce or avoid costly losses of electricity supply in an emergency and/or reduce their impact on customers.

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[1] The generally accepted definition of 'resilience' is *"The quality of being able to return quickly to a previous good condition after problems"*

3 Methodology and timing

The phasing of, and timetable for, the study is summarised in Table 1.

Table 1 – summary of the methodology and timing of the 2002 study

	Activity	Timing
Phase 1	develop questions and notes of guidance	February to March
Phase 2	collect information through visits and review documentary evidence	March to early April
Phase 3	early feedback to companies	2-3 days after the visit
Phase 4	develop scoring system	April
Phase 5	overall report	

4 The assessment questions

The assessment questions were devised to align with the four interrelated themes and designed to identify underlying matters within each theme as summarised in Table 2. Companies made presentations to independent auditors who, in conjunction with the companies' own views, assessed each licensed area against the key criteria.

Table 2 – summary of the question sets from the 2002 study

	Theme	Underlying matter	Number of questions
Section A	preparedness	quality of plans	29
Section B	responsiveness	confidence in plan execution	14
Section C	resilience	risk mitigation	53
Section D	governance	management issues	13
		Total	**109**

5 Presentation of findings

A report was produced, summarising the overall findings and conclusions for each section of the study.

The overall report also summarised some key issues and recommendations that were identified as good practice for all companies to consider.

Its conclusion included the generally held opinion that the study could usefully be repeated on a regular basis, say on a 4 or 5-yearly cycle, but also as the need arises.

In addition to the overall report, company-specific reports were produced on a per-licence[2] basis.

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[2] In the case of the two Scottish transmission companies, the results were included in the same reports as the results for the parent companies' Scottish distribution licences.

The company-specific reports were in two parts: a written document, the results of the findings were presented in the form of a 'radar plot' for each of the four themes / underlying matters.

The findings for each element of the questionnaire was given a score between 0 (poor) and 5 (good practice).

Figures 1 to 4 show the actual radar plots for WPD's South Wales licensed area.

Figure 1 – 'quality of plans'
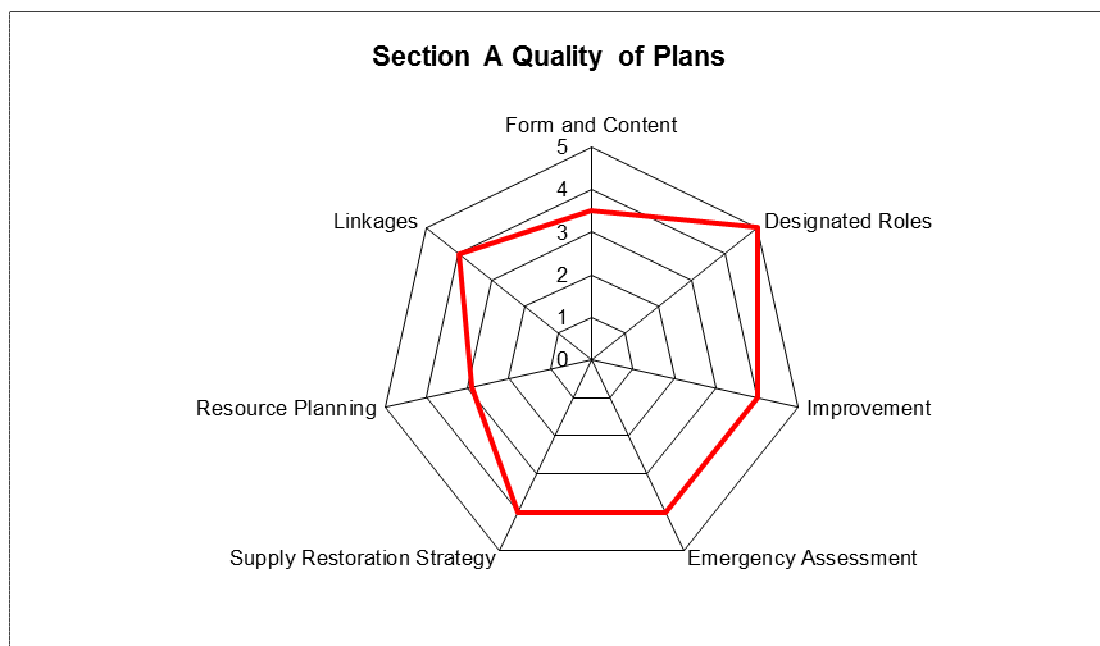
Figure 2 – 'confidence in plan execution'
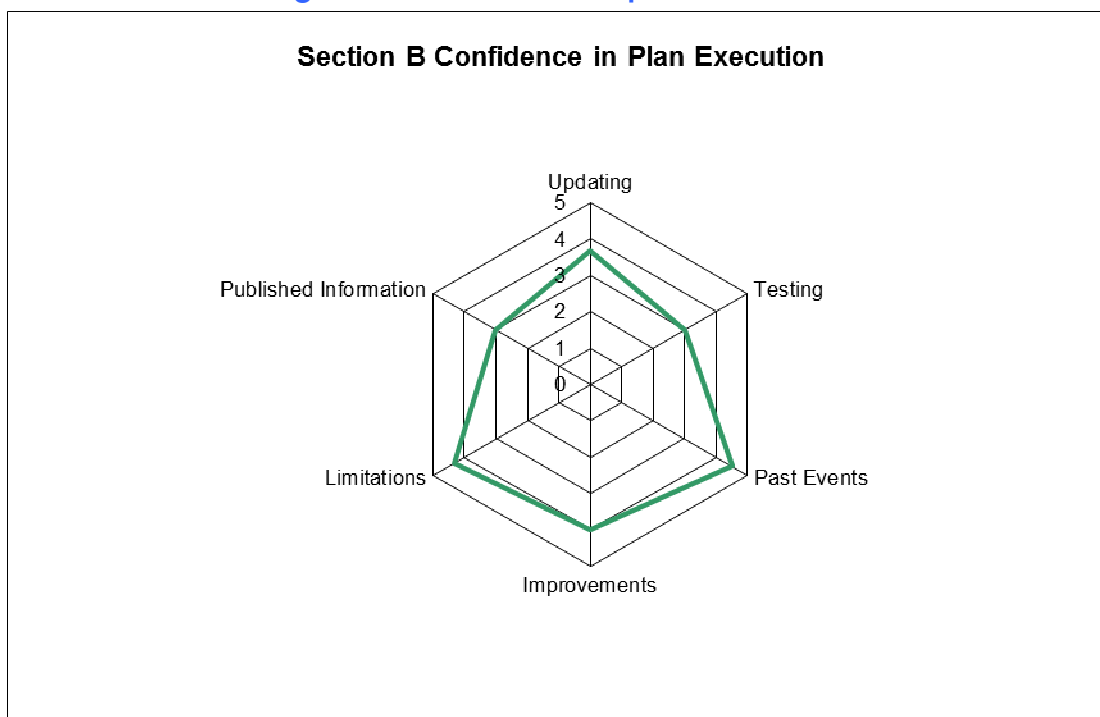
Figure 3 – 'risk mitigation'

Section C Risk Mitigation
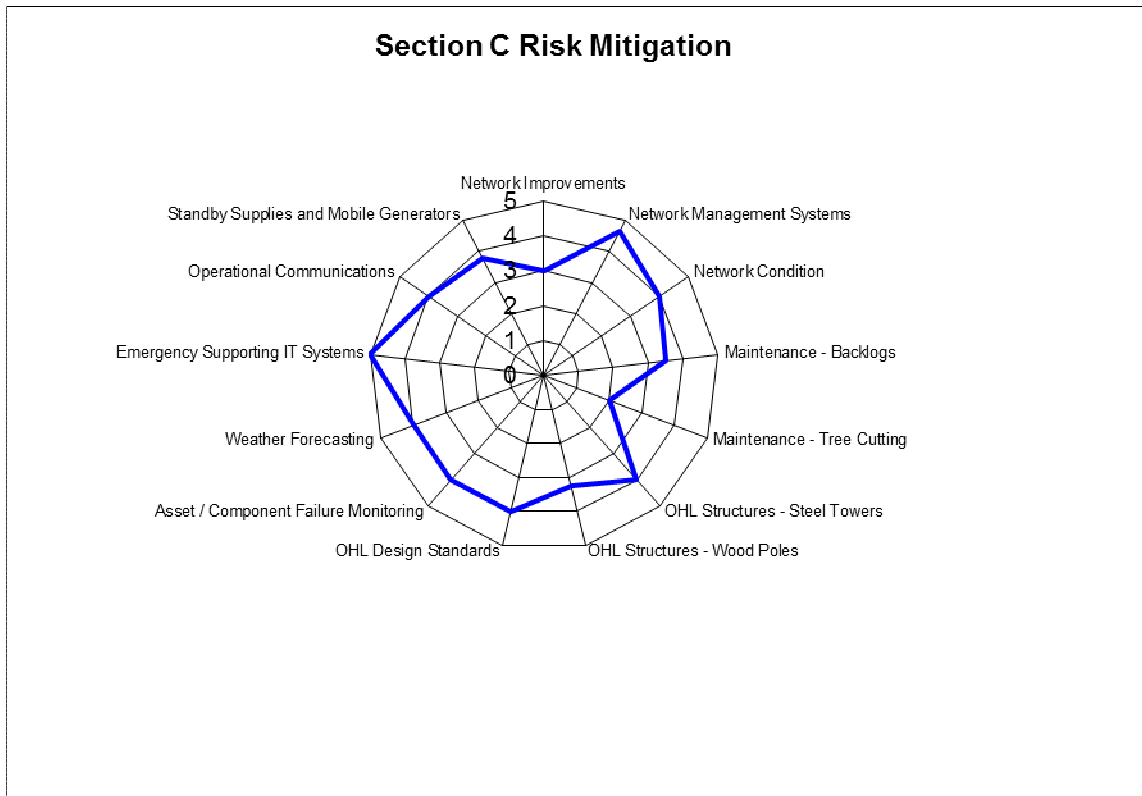
Figure 4 – 'governance'

Section D Governance
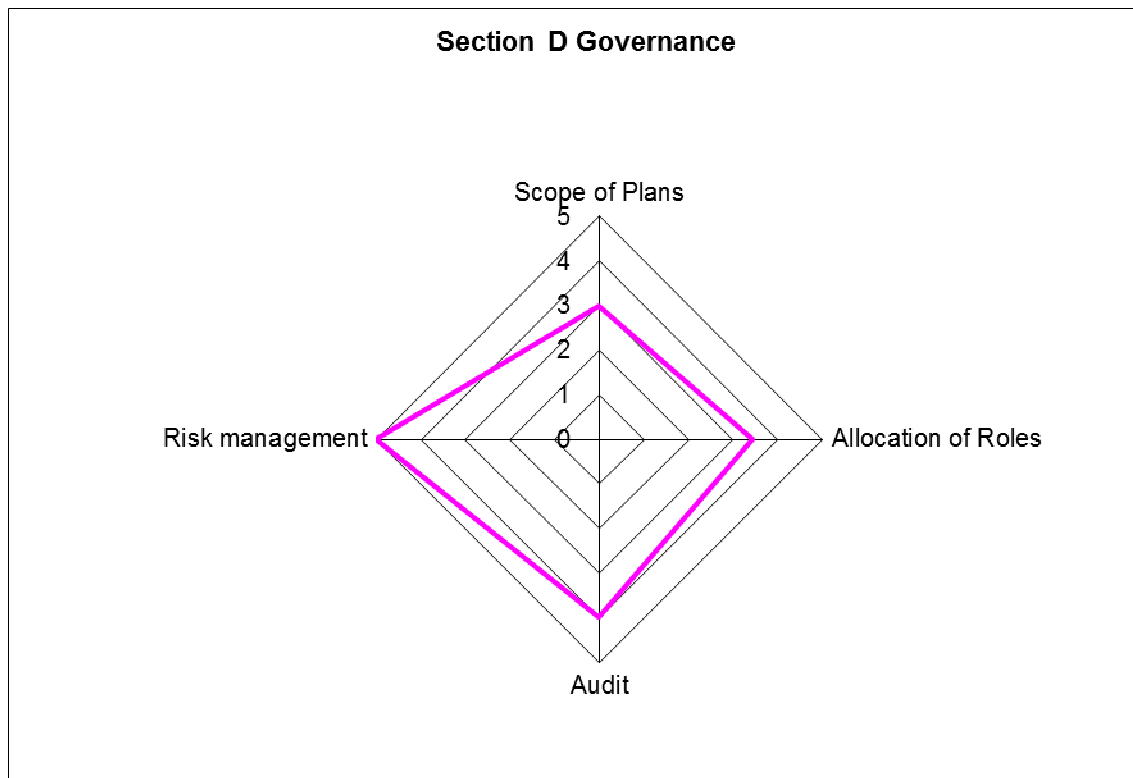
Appendix 1 – the questions from 2002

For completeness, the questions used in the 2002 study are appended to this paper.

Please note they have been reformatted from the original versions to better fit the layout of this paper.

Whilst, by necessity of the task at that time, the questions relate to the UK's electricity networks, the authors of this paper believe that the content can be updated and the context readily adapted to other utility sectors.

Question Section A – "Quality of Plans"		
Question	**Evidence Required**	**Effectiveness & Integration**
Form and Content 1. What events are covered within the contents of the emergency plan(s)? 2. What is the maximum scale of each emergency planned for? 3. At what frequency is the plan(s) audited?	Individual plans or a single plan detailing emergency plans & procedures for the following: a) Adverse weather conditions. b) Terrorist action/Civil disaster and scale. c) Industrial action/staff shortages and scale. d) Black starts and scale. e) Load shedding and scale. f) Internal sabotage (e.g. IT systems). Evidence on plan structure. Refer to section B. Evidence that the scale of plans conforms with the framework of corporate governance. Refer to section D.	If the plans are separate, are they related or are they stand-alone? Is information shared between the plans? If one plan was operational would this compromise the effectiveness of another being actioned?
Responsibility 4. How are the persons responsible for activating and then managing the plan(s) defined? 5. What arrangements are in existence for deputies?	Board/Management level approval of the plan has been given and authority vested in those who need it to implement the plans. Evidence that the plan defines the responsibilities against individuals, that these individuals have agreed to and understand them. There is a management structure defined for emergency conditions. There is a clearly identified 'Emergency Manager' or equivalent, nominated deputy etc, with 24-hour availability. Role profiles and competencies have been established against the emergency roles. Assurance that staff are quickly and accurately assigned roles.	All employees know who the responsible persons are and more importantly what procedure to use to contact them. Link to section D

Question Section A – "Quality of Plans"

Question	Evidence Required	Effectiveness & Integration
Improvement 6. What considerations have been taken both within and outside the company when developing the Emergency Plan(s)? 7. What is the company's post-event procedure?	Emergency Plan(s) shows clear evidence of past event input. Evidence of plan modifications that are linked to past events/test scenario results and corrective actions have been addressed. Evidence that a broad spectrum of events has been reviewed. Some of the events were outside the company.	Trigger points for initiating a review are clearly defined. Reviews of past events/tests are included within the plan(s). Outcomes have been integrated into the current procedures and the effectiveness of these changes have been monitored.
8. Have other Emergency/Disaster Recovery models been used to construct the plan?	Evidence that best practice from other organisations has been considered, modelling techniques (such as network modelling, risk analysis) have been employed in the decision making process for the plan(s). Actual performance of plan areas on test match those predicted. There has been clear use of Disaster Recovery or specialist consultant's advice.	The company subscribes/contributes to recognised institutions, which offer advice on industry best practice and modelling techniques. The effectiveness of these techniques is monitored against actual data.
Emergency Assessment 9. How would the company establish the scale of network damage in the field and the number and disposition of customers off supply? How is this translated into an overall assessment for resourcing purposes? How does the company set target times for a realistic assessment of their resources and materials requirements?	The Emergency Plan requires true workload to be established as quickly as possible. This may require external resource such as helicopters. Evidence that arrangements are documented to activate and sustain these. Evidence of how information is built into an accurate assessment of resources needed and the length of time this takes.	The employment of field establishment of emergency scale, quickly defines the magnitude of the problem and actions response teams where most effective on the network.

Question Section A – "Quality of Plans"		
Question	*Evidence Required*	*Effectiveness & Integration*
Emergency Assessment (continued)	The company has a method of making an assessment of the likely duration of an emergency to its customers, staff, media and suppliers. Assessment of duration is based on scale of the event and the resources available.	
Service Restoration Strategy 10. How does the plan(s) incorporate a service restoration strategy? Are the key stages defined?	Emergency Plan(s) include a service restoration strategy. Critical stages of service restoration are defined and documented. For example, major conurbations. Evidence that resources will be deployed to maximise the number of service restored to customers per hour (or details of and rationale for other criteria applied). Evidence that repair work is scheduled and prioritised to achieve maximum restoration of service in the minimum time. Evidence that single consumers affected by multiple faults are identified.	Procedures allow for the most effective use of infrastructure monitoring and condition feedback to enable decisions to be made, to effectively restore lost service to as many key customers as quickly as possible.
Resource Planning 11. How are resource requirements assessed? Demonstrate how the scale and type of an event relates to the measurement of resource requirements. 12. What metrics are used in this assessment?	A clear plan or procedure is documented which defines the measurement of resources required against the various scenarios. Scale as well as types of scenario are considered and the resources are measured in quantified amounts by industry recognised units.	

Question Section A – "Quality of Plans"		
Question	*Evidence Required*	*Effectiveness & Integration*
Resource Planning (continued) 13. Are 'office' staff (covering the range of essential staff including call handling, administrative services and support employees, procurement, logistics, welfare) trained for an emergency? Are the changes to their roles during emergency conditions defined and are they trained to fulfil them? 14. Has the company identified the sizes of office teams necessary for the various emergency scenarios? 15. Can the company field shadow office teams to sustain a long running emergency?	Evidence that how these roles change in an emergency is well defined. Evidence of training in these roles (including some measure of staff performance during actual/test scenarios. Performance is reviewed and corrective action taken if necessary). Refresher training (frequency etc). Evidence that teams are allocated to various scenarios and shadow teams are identified. Staff turnover is reviewed and training needs linked to this assessment. If necessary complement of office staff is not available, arrangements for the mobilisation of alternative teams. Evidence of communication of information links to supply business(es), other providers. Call centre telephone handling is dealt with by a fully documented procedure, customer confidentiality is maintained and there are no conflicts of interest between competing customers and the DLH.	Staff are fully trained how to operate during emergencies. Training is practised regularly to ensure effectiveness. Reviews of performance are used to monitor and improve the effectiveness of decisions made and actions taken. Staff recruitment/training is clearly linked and the timeliness of emergency training identified.
16. Has the company identified the required numbers and types of field staff needed for each type of scenario/level of escalation clearly identifying the skills and levels of authorisation required? Are the outsourcing arrangements defined and secure? Are the additional staff adequately equipped once sourced?	Where shortfalls in staff are likely to exist, arrangements are in place to acquire the additional fully trained and appropriately authorised staff. Evidence that provision has been made for the support of additional staff in relation to welfare, adequate tools, communications, fuel and health & safety awareness to complete the tasks required.	Assessment of staff skills and knowledge matches network activity requirement during the emergency condition. Acquisition of staff does not compromise health & safety of individuals or the public.

Question Section A – "Quality of Plans"		
Question	*Evidence Required*	*Effectiveness & Integration*
Resource Planning (continued)	Evidence that triggers are in place to request additional cover as soon as practically possible. Evidence that the sources of labour either from within the company or external to the company is secure. Agreements exist within contracts with suppliers of critical resources. Shared company resource has documented prioritisation, i.e. pond depletion. The effective deployment of extra staff is not delayed or prevented by the inability to produce emergency orders or the availability of finance. Evidence that any procured emergency staff are trained and geared towards the requirements of a utility company.	Strategic alliances have already addressed operational issues, equipment differences, operational differences, prior to offering additional staff.
17. Has the company defined numbers /qualification of external operational engineering/supervisory staff required for each type of scenario/level of escalation? Are the sourcing arrangements defined and secure?	The number of operational engineers has been defined for each condition, together with specialist roles (for example, control engineers). The availability and suitability of these personnel is regularly reviewed. Evidence that additional resources are secure, with an assessment of the impact of a widespread emergency which may mean competition for the same resource. Rules of prioritisation are established between companies.	A risk assessment has been undertaken to highlight the dangers of importing temporary operational/supervisory staff with the level of required familiarity. Additional training, safety rules and keys for access are provided before commencement of work. For Q21 to 25 include an overall assessment of metrics and the evidence that these are valid.

Question Section A – "Quality of Plans"		
Question	*Evidence Required*	*Effectiveness & Integration*
Resource Planning (continued)	Other companies/providers' certificates of SAP/safety authorisation are formally recognised. (Any additional training for familiarity of safety and operational requirements of a new network are mandatory before commencement of work.) Evidence of support for those out-sourced staff in relation to communications and welfare.	
18. Does the Emergency Plan(s) address material resources, (spares, transport etc) required during an emergency?	The company either holds emergency stocks of strategic spares, specialist tools and materials or has contracted with suppliers to hold emergency buffer stock. Defined arrangements for strategic spares need to be in place (evidence of contractual arrangements with suppliers/partners). Evidence of transport contingency allowed for additional vehicles/disruption of roads to deliver materials. Problem supplies are defined, for example, non-standard items, obsolete items where direct acquisition would otherwise be lengthy and difficult. Evidence of an assessment of likely equipment requirement for each scenario and the criticality of it to the network capability and performance. Evidence of adequate provision has been made for availability.	Current stock levels are known, the system is controlled by an accredited quality system. Strategic suppliers are identified and alternatives for each are logged. Lead-times for each component/asset type are known. Like assets are linked, for possible redeployment. Global suppliers as well as local suppliers are considered to lessen the effect of localised disaster. Adequate stocks of components and the required tools to replace them are held at various sites. Ideally stocks of spares and maintenance equipment such as vehicles/hoists/trailers should not be stored within the same building. Both material and resource are spread around the network area.

Question Section A – "Quality of Plans"		
Question	*Evidence Required*	*Effectiveness & Integration*
Resource Planning (continued) 19. What allowances have been made in the plan(s) for the non-availability of resources due to other competing factors?	There is documented evidence that makes provision for previous competing arms of organisations to be brought together under emergency conditions such that no conflict of interest exists and that additional resource is allocated to resolve emergency issues. This may require staff to be multi-skilled or for the company to employ extra staff from other geographic areas (possibly countries) and the operational and language issues are addressed.	The plan includes training of staff to be multi-skilled and the allocation of resources allows continuation of other business activities during an emergency event without total disruption to these other areas.
Linkages 20. How do the plan(s) link to the relevant emergency services and/or Government agencies?	The plan(s) has contact links established with all emergency services (fire, ambulance, and police), military and relevant Government agencies. The frequency of exchange of information is regular. Examples of information exchange covering the last 12 months are available.	The plan has regular airing with the emergency services and is regularly reviewed and updated in accordance with their procedures. Any Government Agency information affecting key issues relating within the documents are assessed and modified to suit, in line with the requirements of the quality system.

Question Section B – "Confidence in Plan Execution"		
Question	*Evidence Required*	*Effectiveness & Integration*
Updating 1. What is the process for updating the plan? 2. Who is responsible for updating the plan? 3. Is there a process for any necessary re-training following plan modification?	The plan(s) conform to an internationally recognised quality system, using an audit regime. The plan is regularly reviewed and updated, there are clear responsibilities for updating the plan. The latest modification can be date verified. The audit regime allows for the influence of external bodies such as emergency services, Government agencies, regulatory, national and international standards. Evidence of training needs analysis being part of the process.	Corrective actions and plan modifications are updated swiftly and included as quickly as possible. Amendment is real time or as near to it as possible. Modification status of plan is known company wide. Access to the plan and its modifications are universal and straightforward. Modifications are agreed and signed for by the people deemed responsible.
Testing 4. Has the Emergency Plan(s) been recently tested? 5. What was the last date of test, how was it tested and who was involved? 6. What were the results of the last test and has the plan been updated following the test? 7. Does the Management Board review the plan and receive reports on plan tests?	The plan(s) (or a scaled down version within the limits of practicability) has been tested within the last twelve months based either on actual events or test scenarios. Details of event, predicted performance and actual performance is available with the results being used to update the plan. Details of those informed or taking part are available with feedback being included to these parties. The plan test results are presented to the Management Board for inclusion at specific agenda driven meetings. Have any changes made as a result been incorporated into the defined roles and responsibilities.	Board level management receives and reviews the measure of performance at specific agenda driven meetings. Board level comments and actions are communicated to middle management level and these actions are either relayed to operational staff by means of modification or addition to the plan.

Question Section B – "Confidence in Plan Execution"		
Question	*Evidence Required*	*Effectiveness & Integration*
Testing (continued)	The company can quantify its confidence that it can deliver the same performance level for a real emergency.	
Past Events 8. How many times has the plan been activated in the last five years and what was the scale of the emergency in each case? 9. How did the company assess and measure its performance on each occasion that the plan was activated?	The company has activated the plan(s) in the last five years. Emergency scales can be determined for each case. The company measured its actual performance against that planned/predicted. Results from past performance are input into the current emergency plan structure. Plans have been continuously revised to reflect changes in structure.	Actual performance data has been used to effect plan modification. There is a measure of actual performance against planned. Shortfalls are documented and training plans/actions taken to address deficiencies.
Improvements 10. Has the company identified areas of the plan that will outperform compared with the previous activation? Give details and define the extent of the planned improvement. 11. What specific and measurable improvements have been made over the last five years? Give details and metrics against each category. For example, systems and resources.	Areas of performance which were lacking at the last plan activation have been addressed and modelling or testing has been undertaken that proves that the area will outperform when requested. Measurable improvements are listed in areas such as management, resources, systems, IT and communications. Other disaster scenarios have been considered that would affect the outcome of this performance.	Improvements can be measured in management, resource, systems or communications areas in the last five years. Improvements consider wider issues than just the emergency event tested; risk analysis has been applied to mitigate risks associated with the changes.
Limitations 12. What definitions are used to identify limitations or events that may fall outside the plans? Provide examples.	The company has assessed the limitations of its plans and has defined what events are outside its planning scenarios. These limitations have been verified by consultation with relevant bodies, such as the emergency	Plan limitations are well communicated, as are the contact details and decision making process for events that fall outside the limits of the Emergency Plan.

Question Section B – "Confidence in Plan Execution"		
Question	*Evidence Required*	*Effectiveness & Integration*
Limitations (continued) 13. What scenarios or likely events fall outside the plan(s)?	services, government agencies and major customers. Definitions of limiting factors and limiting events are clearly made within the plan(s). Limitations to the plan are not just stated but implications considered, acknowledged and contacts provided to enable positive external influence on the event, even if outside plan control.	
Published Information 14. What reports have the company made publicly available detailing previous events, the impact upon the company, their response and an assessment of the success of their plans? Give details of all published material covering the last five years including any information that has been sent directly to customers.	The past event history and performance of the company, detailing actual activity against planned activity, plus resulting plan modifications has been published. Either self or independent assessment of the robustness and successfulness of the Emergency Plan(s) has been undertaken. Material detailing performance has been sent to customers. Facts within the literature can be verified from KPIs or call centre/customer care information.	Literature has been generated giving a true reflection of the company's performance during times of emergency condition. This may include fault logging to repair times, call centre information, network availability information, capital investment detail. The company has used a potentially destructive situation to prove to its customers its strengths during a time of stress and has turned a negative situation into a customer positive one.

Question Section C – "Risk Mitigation"		
Question	*Evidence Required*	*Effectiveness & Integration*
Infrastructure Improvements 1. What improvements have been made to the utility's infrastructure during the last five years which will improve its ability to withstand incidents from whatever cause?	Documented procedures and policies put in place over the last five years can be seen to be increasing the reliability of the infrastructure. Where appropriate, more automatic and remote control features have been added and obsolete and unreliable assets have been removed. Percentages of the above assets, by type, that have been replaced. The system planning policies have been reviewed and improvements/corrective actions made. The company has produced guidance on system enhancement in accordance with the relevant standards. There is evidence of enlarged system capacity and additional features to enhance the resilience of the infrastructure during an emergency.	Improvements have been spread over asset hardware, training and automation systems. The assets and equipment that have been improved is easier to use; a higher percentage of operations can be achieved remotely. Training has been given to the necessary staff, so that utilisation of the new equipment is effective and seamless during an emergency. The capacity of the infrastructure has increased by design. Areas of low capacity have been identified and amendments to assets made to improve capacity during non-routine operations.
Infrastructure Management System 2. How do the design features of the infrastructure management system incorporate the requirements of emergency conditions? 3. What is the company's basis for its confidence level in the reliability, resilience and capacity of the infrastructure for the workload likely to be placed on it at times of emergency?	The company's network management system has network indications and control available. There is correlation between customer calls and network conditions. The system provides a fault message interface with abnormalities, establishing a customer-network link. The system has availability to work "off-line" in a scenario test mode. The system has means of alternative communication. IT support is available to reinforce the system, possibly running from more than one location.	The network management system interfaces both the customer information and field information from operational staff. Calls notifying lack of service are used to map problems. Feedback from on-site visits is swift to eliminate wasted parallel visits. Call centre information logs caller's address and relates to asset register/infrastructure maps. Inspection/repair teams are mobilised from this data.

Question Section C – "Risk Mitigation"		
Question	*Evidence Required*	*Effectiveness & Integration*
Infrastructure Management System (continued) 4. Does the company have a dedicated and verifiable back-up facility should its first-line ('business as usual') system become unavailable?	The back-up facility is as extensive as the first line system. The back-up can sustain itself and perform its function for the duration of the emergency. The management system changeover to back-up is instant. The network management system has procedures fully defining the resource both in terms of hardware and people, with sources defined and contingency plans according to event scale/multi-event occurrence. This facility is subjected to regular audit.	The back-up management system is well integrated into training of company employees. Those with responsibilities that change during an emergency event are fully aware of their responsibilities and to whom they are responsible. The back-up system is completely separate from the first-line ('business as usual') network management system. The effectiveness of the back-up system can be confidently assessed by the training records of personnel, documented procedures and secondary IT support.
Infrastructure Design Standards 5. What design standards are used for new build and re-building of asset infrastructure?	The criteria are appropriate approved standards. For each applicable asset type, design standards are defined, documented and reviewed. When choices are given for infrastructure capacity, design procedures define which parameters are to be used and why.	The appropriate standards are freely available to all design staff/contracted design engineers.
Asset/Component Failure Monitoring 6. How does the company system for investigating asset/component failures and collating the information, allow for emergency incidents and other abnormal conditions?	The asset failure monitoring system will require a reason for failure to be established in all cases of asset failure and the vast majority of component failure.	The company contributes to the national plant defect reporting scheme and has a process in place to ensure lessons learnt elsewhere are considered within-house. Asset failures that could cause harm to people or damage to property are considered in relation to the asset base as a whole.

Question Section C – "Risk Mitigation"		
Question	*Evidence Required*	*Effectiveness & Integration*
Asset/Component Failure Monitoring (continued) 7. Is trend data derived from failure statistics; how is it derived and how is it used to set KPI's? 8. How is this information utilised in maintenance policy, replacement policy and risk management /contingency planning and how is this linked to the emergency plan at point of implementation?	The asset failures are logged, current outages are known, the inspection & maintenance policy logs straight into the failure register so cleared network faults are acknowledged swiftly and efficiently. Asset failure monitoring system allows weather and other incident trends to be established and allows feedback of this typical data to update the inspection/maintenance regimes. Investigate trend evidence and view KPI's Review how the information is used in policy formulation.	Operational restrictions are applied as necessary with swift implementation within-house. Any such actions are swiftly communicated nationally.
Operational Communications 37. What is the basis for the company's confidence level in the capacity, reliability and resilience for the various emergency scenarios including the additional requirements for additional staff drafted in from outside the company? 38. What are the available back-up facilities and have they equivalent capacity to the main system?	Details should be available for additional phones or radios as relevant and evidence of spare capacity available to be taken up. Details of the security of cell phones and capacity of industry systems required if they are to be used. This facility is included in a disaster recovery plan.	Methods of communication between those staff internally equipped and those externally equipped must be compatible. Communication to the additional staff is key, if cell phones are not available or coverage areas are dead, alternative means of communication should be considered.

Question Section D – "Management Issues"		
Question	*Evidence Required*	*Effectiveness & Integration*
Scope of Plans 1. What is the company's definition of an emergency? 2. What types of incidents have the company planned for? 3. What scale has been envisaged and what was the basis for choosing the scales for these incidents?	Quality of definition including categories employed e.g. adverse weather, major system/plant failure, civil disaster, industrial action. How comprehensive? Evidence that 'all' eventualities have been reviewed. Evidence of double incident/sustained incident scenario planning. Evidence of breadth e.g. what are the arrangements for coping with industrial action – are dispute resolution processes built into agreements with trade unions? Rationale for scaling.	Definition embodied in documentation, communicated to staff and understood by all those involved. Plans developed and structured to reflect the range of scenarios. Where plans are distinct (e.g. those dealing with adverse weather and those dealing with industrial action or staff shortages) evidence of integration.
Allocation of responsibilities 4. Who is responsible for Emergency/Incident Planning at Management and Board level? 5. Who is responsible for Emergency/Incident Management at Management and Board level? 6. Who is responsible for Network Performance Improvement at Management and Board level?	Clear delegation of responsibilities, evidenced in organisation charts, job descriptions and or plan documentation. Nominated deputies. Separate emergency management structure. Escalation arrangements and evidence of 24-hour cover.	Evidence of logical cluster of responsibilities. Integration with overall disaster recovery arrangements. Link to Section A
7. Does the company set targets for the restoration of 'normal service' following such incidents? If not, how is performance assessed?	What is the mechanism by which these are set? Evidence and examples. Relationship to overall and guaranteed standards.	Targets logically related to normal standards. Evidence of/forecasts of performance.
8. What incentives are in place for asset owners and service providers?	Evidence of performance indicators. Existence of incentives.	Fit with overall performance targets/KPIs. Relative importance in assessing overall performance.

Question Section D – "Management Issues"		
Question	*Evidence Required*	*Effectiveness & Integration*
Allocation of responsibilities (continued) 9. Does the work involved in the restoration of normality involve a service provider (internal or external)? 10. What arrangements are in place to test and verify that the service providers can deliver their required service levels at times of emergency?	Clear allocation of responsibilities and nominated 'officers', Scheme of Delegated Authority (SODA). Clear description of contractual arrangements identified in plan. Evidence that contractual arrangements are routinely reviewed/simulated/tested.	Integration of management systems, resource planning and information transfer.
Audit 11. Are Emergency Incident planning, network maintenance, network improvement, network performance and Incident management covered in the company's governance?	Overall description of audit process. Frequency, coverage (e.g. typical contents, indicators of performance) and arrangements for follow up.	Fit and relative importance within audit and risk management activity.
12. What were the key findings and lessons learnt from reports covering the last five years and what actions have been taken or commissioned following the reports?	Example of report(s). Evidence of systematic follow up and progress reporting (e.g. management meeting minutes, technical surveys)	Outcomes built into normal work plans/programmes.
Risk Management 13. Is Incident Management included on the Company's Risk Register implemented in line with the Turnbull Report's recommendations to Companies on corporate governance associated with risk management?	Existence of risk register with coverage of emergency planning and management. Evidence of Board/Management Committee approval of risk assessments associated with incident management.	Fit of this aspect of emergency planning and management within company's disaster recovery planning and overall corporate governance.