Eskom Generation	MANUAL	

Title: **Management & Reporting of Strategic Spares**

Unique Identifier:	**36-972**
Document Type:	**GMN**
Revision:	**0**
Effective date:	**August 2009**
Total pages:	**23**
Revision date:	**August 2012**
Classification	**PUBLIC**

This document has been seen and accepted by:
Power Station Managers
Portfolio Engineering Senior Managers
Projects & Outage Senior Managers
Power Station Engineering Managers
Power Station Maintenance Managers
Nigel Volk (Asset Management Department)
Louwrens Luyt (Generation Production & Control)

COMPILED BY	FUNCTIONAL RESP.	AUTHORISED BY
L Reddy	**A Nakedi**	**T Govender**
Asset Management Dept	**GM GST&A**	**Managing Director**
Generation Division	**Generation Division**	**Generation Division**
Date:	Date:	Date:

REVISION	DESCRIPTION OF REVISIONS	APPROVAL	DATE
0	Replaces GGS1495 with addition of strategic spares qualification process, revised strategic spares list for coal-fired power stations and change of reporting for rotable strategic spares (yellow (RS) status).	MD(GD)	Aug'09

PUBLIC
When downloaded from the GDS database, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.
Generation Group Documents / GMN Manual Template Rev 1 May 2008

Contents

Page

Introduction 3

1 Scope 3
1.1 Purpose 3
1.2 Applicability 3
2 References 4
3 Definitions and abbreviations 4
4 Development of Strategic Spares List 5
5 Strategic Spares Health Programme Requirements 7
6 Roles & Responsibilities 10
7 Records 11
8 Annexes 11
Annex A – Strategic Spares Qualification Process 12
Annex B – GSSHP Audit Criteria 15
Annex C – Strategic Spares Health Status Report 17
Annex D – Examples of a "TLC" 19
Annex E – Minimum Storage & QC inspection criteria for selected strategic spares 21

PUBLIC
When downloaded from the GDS database, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.
Generation Group Documents / GMN Manual Template Rev 1 May 2008

Introduction

Due to the unprecedented depletion rate of the generating reserve margin, the effect of unplanned generating plant outages has become more pronounced. Furthermore, generating units are required to operate at high load factors, leading to adverse component degradation and unpredictable failure rates. The fact that a majority of the generating units have either passed or reached the mid-lives of the original design lives has compounded this problem.

These unpredictable failures result in capacity constraints and hence challenge the reliability of supply. Depending on the severity of the event, turnaround times can be excessive, resulting in:

- loss of production revenue
- high spare parts costs to expedite lead times
- elevated labour costs due to pressure for short turnaround times
- increased production costs due to the prolonged use of gas turbines
- poor workmanship due to production pressure, leading to a further rise in failure rates

However, if a replacement spare is available these effects are reduced considerably and in some cases eliminated.

The Generation Strategic Spares Health Programme Standard (GGS 1495) was developed to ensure the availability and serviceability of the identified strategic spares. However, this framework was not seen to be mandatory. Furthermore the original list of strategic spares was developed from experience in the absence of a defined set of criteria of what defines a strategic spare.

1 Scope

1.1 Purpose

The proper application of the requirements contained in this document will:

1.1.1 Instil a common understanding of the intent of the strategic spares.
1.1.2 Ensure that the correct spares are identified through a systematic and transparent methodology.
1.1.3 Provide a management framework that ensures that the identified spares are procured and maintained in a condition fit for service.
1.1.4 Support Generation's strategic objectives to maximise plant availability.

1.2 Applicability

This document is applicable to all power stations in the Generation Division.

PUBLIC
When downloaded from the GDS database, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.
Generation Group Documents / GMN Manual Template Rev 1 May 2008

2 References

The following documents contain provisions that, through reference in the text, constitute requirements of this document. At the time of publication, the edition(s) indicated were valid. These documents are subject to revision and users are responsible to ensure that the most recent editions of the documents listed below are used / referenced.

- BS4999-144: Stator bar Testing.
- EPC 32-188: Eskom's Procurement and Supply Chain Management Procedure
- EPC 32-204: Accounting for Strategic Spares
- ESKASAAF1: Oil Dielectric Strength Confirmation.
- ESKASAAI3: Prolonged Storage of Key Stock Transformers
- GGD 1155: Shared Strategic Spares
- GGD 1447: Plant Asset Management Directive
- GGM 0826: Partial Discharge Testing.
- GGP 0322: NDT Examination.
- GGS 0391: Refurbishment of Generator Rotor.
- GGS 0392: Refurbishment of Generator Stator.
- GGS 0580: Maintenance and Repair of High Temperature and High Pressure Valves and Fittings.
- GGS 0684: Testing Of Generator Rotor.
- GGS 0700: Life Management of Coil Retaining Rings in Turbo Generators and Major Motors.
- GGS 1181: Avoid Contact with Harmful Products.
- GGS 1495: Generation Strategic Spares Health Programme
- OPG0159- 06: Material Control Guideline
- 36-1042: Material Control, Preservation & Storage Handling

3 Definitions and abbreviations

3.1 Definitions

3.1.1 **In-storage maintenance**: those activities associated with periodic maintenance, adjustment, monitoring, or items to prevent or detect deterioration while in-storage.

3.1.2 **Storage requirements:** measures taken to mitigate various environmental factors to prevent deterioration, damage, or contamination of item while in storage. These measures include climate control, packaging, inspections and in-storage maintenance

3.1.3 **Strategic Spares:** those items of plant, which if not readily available in inventory or from suppliers would directly cause the loss of generating, transmission or distribution capability (i.e. items without which continuity of supply will not be possible). Items are classified as strategic spares based on considerations such as the **effect on operations if the item is not available, probability of need, source and lead-time**. Strategic spares include both capital spares and non-capital spares (hereafter referred to as strategic inventory). They are held in inventory for deployment in the event of a **major plant failure**.

3.1.4 **Availability:** refers to whether a functional replacement spare exists in Generation but does not refer to whether the spare is in a good working condition (i.e. fully serviceable).

When downloaded from the GDS database, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.
Generation Group Documents / GMN Manual Template Rev 1 May 2008

3.2. Abbreviations

3.2.1. F&AD – Forensics and Audit Department
3.2.2. BU – Business Unit
3.2.3. CR – Conditional Release
3.2.4. CRR – Coil Retaining Rings
3.2.5. CV – Control Valve
3.2.6. FD – Forced Draft
3.2.7. FTR – Free Text Retrieval
3.2.8. GENOPS – Generation Operations Meeting
3.2.9. GIM – Generation Information Management
3.2.10. GM – General Manager
3.2.11. GSSHP – Generation Strategic Spares Health Programme
3.2.12. GST&A – Generation Strategy Technology & Assurance
3.2.13. HP – High Pressure
3.2.14. HV – High Voltage
3.2.15. ID – Induced Draft
3.2.16. IP – Intermediate Pressure
3.2.17. LOPP – Life of Plant Plan
3.2.18. LP – Low Pressure
3.2.19. MD (GD) – Managing Director (Generation Division)
3.2.20. NCR – Non Conformance Report
3.2.21. NDT – Non Destructive Testing
3.2.22. OEM – Original Equipment Manufacturer
3.2.23. PA – Primary Air
3.2.24. PM – Planned Maintenance work activity issued/scheduled from SAP PM
3.2.25. SAP - System Application Products
3.2.26. BU - Business Unit
3.2.27. (SAP) PM – A module in SAP/R3 software known as Plant Maintenance.
3.2.28. (SAP) MM – A module in SAP/R3 software known as Materials Management
3.2.29. TLC – Traffic Light Chart
3.2.30. UCLF – Unplanned Capability Loss Factor

4 Development of Strategic Spares List

The basic tenet behind the development of the strategic spares list is based on the need to ensure that plant equipment can be quickly returned to service to minimise impact on production, in the event of a **major plant failure.** Therefore, a strategic spare is not meant to prevent failure, only to minimise the impact once **major plant failure** has occurred.

4.1 Assumptions

In order to develop the criteria and the process for identifying the strategic spares, the following assumptions were made;

4.1.1 **The precursors for all the major plant failure incidents are all internal to boundaries of the production unit.** Strategic spares are not meant to mitigate the consequent effects of plant events.
4.1.2 **Adequate maintenance programme exists for all plant equipment.** The implication is that strategic spares are not necessitated by normal maintenance.
4.1.3 **Process for ensuring functional integrity** for both standby equipment and redundant equipment is in place.

PUBLIC
When downloaded from the GDS database, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.
Generation Group Documents / GMN Manual Template Rev 1 May 2008

4.2 Strategic Spares Qualification Criteria

For a plant component to qualify for a strategic spare it must satisfy the following criteria:

4.2.1 It must have no redundancy. If there is a redundancy in the plant function, or if the full production capability can continue then a direct loss of production does not result from the failure of the plant component.

4.2.2 Time-to-failure can be reliably predicted. If one can monitor the condition or performance of the plant to better predict an impending failure then the time-to-failure can be predicted with a high degree of confidence therefore a replacement spare can be acquired when the need arises.

4.2.3 In case of a refurbishable plant component, a replacement spare should be able to restore the lost production capability in a time considerably shorter than it would take to refurbish the failed component.

4.2.4 The normal lead-time of a replacement spare for the failed plant component must be in excess of a period equivalent to 1% of the BU's UCLF. The implication is that if a replacement spare can be readily sourced and deployed in time for the unit to be returned to service without a significant (greater than approximately 1 month) delay to the repair programme then the spare is considered readily available.

4.2.5 There is a high level of confidence that a spare can be maintained in a fully serviceable condition for the life of the plant component that it is intended to replace? If the functional condition of a replacement spare can be maintained over the life of the plant component then the intended benefit of the spare is ensured.

4.3 Strategic Spare Qualification Process

The process flow chart for the identification of strategic spares is attached in **Annexure A.** This process employs the five (**5**) qualification criteria mentioned in subsections **4.2.1** to **4.2.5,** at various stages, to identify plant components that qualify for strategic spares.

Strategic Spares List

Through the application of Strategic Spares Qualification process depicted in **Annexure A,** the following list of Strategic Spares was developed. This list is mandatory for coal fired base load stations. The spares have been prioritised for procurement purposes in line with the capital rationing exercise.

PUBLIC
When downloaded from the GDS database, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.
Generation Group Documents / GMN Manual Template Rev 1 May 2008

a. Coal-Fired Power Station List

Item No.	Spare Component	Remarks
1	Unit Transformer	One per station for each type
2	Generator Transformer	Minimum of one per station
3	LP Turbine Diaphragms	Minimum of 50 % per blade row
4	Exciter	Stator, rotor and CRR's for rotating type, Bridge & transformer for static type
5	HP Turbine Governor Valve Cartridge & Actuator	Minimum of one per station (assumes that the valve cartridges are interchangeable)
6	IP Turbine Governor Valve Cartridge & Actuator	Minimum of one per station (assumes that the valve cartridges are interchangeable)
7	Boiler Water Circulation Pump	Minimum of one per station (assumes that the valve cartridges are interchangeable)
8	LP Turbine Rotating Blade Set	Minimum of 50 % per blade row if a fully bladed rotor is available, else carry the full set
9	HP Turbine Diaphragms	Minimum of 50 % per blade row
10	IP Turbine Diaphragms	Minimum of 50 % per blade row
11	HP Turbine Stop Valve Cartridge & Actuator	Minimum of one per station
12	IP Turbine Stop Valve Cartridge & Actuator	Minimum of one per station
13	HP Turbine Rotating blade set	Minimum of 50 % per blade row if a fully bladed rotor is available, else carry the full set
14	IP Turbine Rotating blade set	Minimum of 50 % per blade row if a fully bladed rotor is available, else carry the full set
15	Secondary Air heater Packs	Complete set for one pass as a minimum
16	LP Turbine rotor	Bladed (Minimum of one per station)
17	HP Turbine rotor	Bladed (Minimum of one per station)
18	IP Turbine rotor	Bladed (Minimum of one per station)
19	Generator Rotor	Minimum of one per station
20	PA Fan Motor	Minimum of one per station (assuming that they are uni-directional, else keep one for each direction)
21	FD Fan Motor	Minimum of one per station (assuming that they are uni-directional, else keep one for each direction)

PUBLIC
When downloaded from the GDS database, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.
Generation Group Documents / GMN Manual Template Rev 1 May 2008

22	ID Fan Motor	Minimum of one per station (assuming that they are uni-directional, else keep one for each direction)
23	PA Fan Impeller	Minimum of one per station
24	FD Fan Impeller	Minimum of one per station
25	ID Fan Impeller	Minimum of one per station
26	Generator Stator Bars	Full top bars set and **30 %** bottom bars set
27	Generator Breaker Poles	Minimum of one per station

b. Peaking Power Station List (excl. Ankerlig and Gourikwa)

Hydro/Pumped-Storage (Drakensburg, Palmiet, Vanderkloof & Gariep)		
1.	Generator Transformer	One per type per station, incl. HV/LV bushings
2.	Generator Rotor Pole	One universal winding per station minimum
3.	Generator Stator Bars	Three (3) bottom bars, twelve (12) top bars & three (3) interconnecting bars minimum holding
Gas Turbines (Acacia & Port Rex)		
1.	Generator Transformer	One per type per station, incl. HV/LV bushings
2.	Pump – Liquid Fuel System	Complete pump unit as a minimum
3.	Exciter Rotor	Rotor only as a minimum
4.	Generator Stator Bars	10% off each bottom & top bar, and two (2) line bars minimum (shared)
5.	Generator Rotor	One (1) shared rotor between Port Rex & Acacia (incl. CRR) as minimum

c. Nuclear Power Station List

1.	Generator Transformer	One per type per station, HV/LV bushings incl. (Alsthom & Smit)
2.	Unit Transformer	One per type per station, HV/LV bushings incl.
3.	Generator rotor	Minimum of one per type per station
4.	Stator Bars	Full top bars set and **30 %** bottom bars set
5.	LP turbine rotor	Fully bladed, minimum of one per station
6.	Generator breaker poles	Minimum of one per station
7.	Exciter (incl. rotor)	Stator, rotor and CRR's for rotating type, Bridge & transformer for static type

PUBLIC
When downloaded from the GDS database, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.
Generation Group Documents / GMN Manual Template Rev 1 May 2008

8.	RCV Charging pump	Minimum of one per station
9.	RRA Heat Exchanger	Minimum of one per station
10.	HP Turbine Governor Valve	Internal cartridge & hydraulic actuator complete
11.	HP Turbine Stop Valve	Internal cartridge & hydraulic actuator complete
12.	Intercept/Reheat Governor Valve	Internal cartridge complete & hydraulic actuator complete
13.	Intercept/Reheat Stop Valve	Internal cartridge complete & hydraulic actuator complete
14.	Rod, Control Full Length Assembly	
15.	RPN, Detector Chamber Assembly	CCA12
16.	RCP Motor	
17.	HP Diaphragms	Minimum of 50% of each row
18.	LP Turbine Blades	Minimum of 50% of each row
19.	LP Diaphragms	Minimum of 50% of each row
20.	RPN Ionization Chamber	CBL15

PUBLIC
When downloaded from the GDS database, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.
Generation Group Documents / GMN Manual Template Rev 1 May 2008

5 Strategic Spares Health Programme Requirements

5.1 Strategic Spares Health Assurance

In order to satisfy the intent of the strategic spare, the spare identified for this purpose must satisfy two key criteria, namely;

- Availability, and
- Serviceability.

5.1.1 Availability

The intent of this health status index is to ensure that the spares are available on site and that they can be readily deployed, in the event of a major plant failure condition.

Availability Status	Criteria	Remarks
GREEN	1. Available 2. Spare stored on site 3. In a good working condition	All three criteria must be satisfied
YELLOW	1. Available **2. Spare not on site** 3. In a good working condition	The only criterion that qualifies it as YELLOW **is** that that spare is offsite.
YELLOW (CR)	1. Available 2. Spare on site **3. Reduced performance capability**	Reduced performance is the criterion that qualifies it as YELLOW (CR).
YELLOW (RS)	1. Available **2. Spare not on site** 3. Spare is rotable in nature and requires to be inspected or refurbished before being confirmed to be in a good working condition	A rotable spare removed from the plant must be confirmed to be in a good working condition and this disqualifies it from the **GREEN** status.
RED	1. **NOT** available or permanently destroyed 2. No feedback from the BU 3. Modification outstanding that would make the spare unusable	Anyone of these criteria qualifies the component as **RED**.
WHITE	**Not applicable to the specific BU**	

The desirable state is for the strategic spare to be available, on site and in a good working condition. Hence the **GREEN** status.

When downloaded from the GDS database, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.
Generation Group Documents / GMN Manual Template Rev 1 May 2008

5.1.2 Serviceability

The intent of this health index is to ensure that processes are in place to provide a high degree of confidence that available spares will continue to be in a condition fit for service when they are required for deployment.

Sub-criteria for serviceability

In-Storage Activity	Sub-criteria
Storage Requirements	
1. Storage Procedure	A suitable procedure must be available and was developed in consultation with the OEM or at least the Generation Technical Specialist
2. Storage Execution	Spares must be stored in accordance with the developed procedure.
In-Storage Maintenance Requirements	
3. Maintenance Programme	A suitable maintenance programme must be available. It must provide a detail of maintenance activities to be performed, their frequencies, etc. The maintenance programme must include condition monitoring and testing activities.
4. Maintenance Execution	In order to demonstrate compliance, the service notes or PM's must be loaded on the SAP maintenance module and the history records of performed maintenance activities must be kept.
Protection Systems Requirements	
5. Protection Systems	Protection should be provided against fire, environmental stressors, etc. Periodic testing service notifications or PM's of protection systems must be loaded on the SAP maintenance module and the history records of performed maintenance and testing must be kept.

Serviceability Health Status Index

The serviceability health status index measures the extend to which the requirements have been met in ensuring that an available spare will be in a condition fit for service when it is required.

Status	Criteria
GREEN	If all five sub-criteria are met
YELLOW	If two (2) or less sub-criteria are not met
RED	1. If availability is red or 2. If more than two (2) sub-criteria are not met
WHITE	Spare is not applicable to a specific BU

When downloaded from the GDS database, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.
Generation Group Documents / GMN Manual Template Rev 1 May 2008

5.2 Strategic Spare Compliance

5.2.1 Strategic spares shall be audited against the set criteria (**Annex B**) on a regular basis

5.2.2 The audits shall be built-in into the F&AD Data Integrity schedule.

5.2.3 The audit programme shall be included in the yearly Generation audit plan.

5.3 Strategic Spares Status Reporting

5.3.1 Monthly status report of strategic spares shall be submitted and reviewed on a monthly basis.

5.3.2 The report shall reflect the health status of spare against the Strategic Spare Health Criteria. A example is reflected in **ANNEXURE C.**

5.3.3 The feedback from the BU shall be consolidated in to Generation Strategic Spare Health Programme TLC (**example in ANNEXURE D**)

5.3.4 The Generation Strategic Spares Health Programme TLC to be a visual representation of the status of the specific spare with respect to availability and serviceability, and shall provide an indication in "Robot" format.

5.3.5 The Generation Strategic Spares Health Programme TLC shall be used as an Executive overview and review tool

5.3.6 The Generation Strategic Spares Health Programme TLC shall measure the health of the strategic spares using availability (see 5.2) and serviceability (see 5.3).

5.3.7 The "Robot" indicator shall be reviewed on a monthly basis at the BU's management team meeting. The relevant managers should provide the Power Station Manager with the detailed action plan on how to correct the deviation.

5.3.8 The management and minimisation of "RED" areas i.e. strategic spares that do not conform to the required minimum requirements for availability and serviceability will be managed by means of the Non Conformance Report process.

6 Roles and Responsibilities

6.1 Generation Business Engineering (Fleet Technology)

In executing their responsibilities towards the GSSHP, the Discipline Specialist/Consultants shall:

6.1.1 Ensure that they remain abreast with the status of the GSSHP robot.

6.1.2 Identify shortcomings (alerts) in their respective areas of responsibility and ensure that the responsible power station has compiled an action plan for such items.

6.1.3 Provide specialist advice on strategic spares.

6.1.4 Scrutinise the Generation Technical plan and Life of Plant Plans to ensure that these are aligned with station GSSHP action plans.

PUBLIC
When downloaded from the GDS database, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.
Generation Group Documents / GMN Manual Template Rev 1 May 2008

6.2 Power Station Engineering Managers

In executing their responsibilities towards the GSSHP, the Power Station Engineering Managers shall:

6.2.1 Ensure that gaps in the GSSHP are identified, actions plans compiled for the station and that spares to be purchased are included in the Generation Technical Plan and Life of Plant Plans.

6.2.2 Ensure that site specific storage and quality control criteria exist and are documented.

6.2.3 Write and implement specific procedures as required per site.

6.3 Generation Strategy, Technology & Assurance

In executing their responsibilities to the GSSHP, Generation Strategy, Technology and Assurance shall:

6.3.1 On a regular basis, ensure that a sample of the stations is reviewed against the criteria established to ensure compliance.

6.3.2 Maintain the internal review system and process.

6.3.3 Maintain and update of the GSSHP model and "Robot" indicator.

6.3.4 Ensure that a monthly and quarterly strategic spares status report is available for review.

6.4 Power Station Maintenance Managers

In executing their responsibilities to the GSSHP, the Power Station Maintenance Managers shall:

6.4.1 Drive and keep focus on the GSSHP.

6.4.2 Provide the required inputs for the monthly update of their stations' Strategic Spares Health Programme data.

6.4.3 Ensure that the Generation Strategic Spares Health Programme is implemented and executed against the established criteria.

6.4.4 Ensure compliance with the minimum storage and quality control inspection criteria as per Annex "B" and site specific procedures.

6.4.5 Ensure that review of the GSSHP "TLC" indicator is a standard agenda item at the Maintenance Managers Forum and that status and trends are reviewed.

6.4.6 Appoint a responsible person who will ensure that all reports are submitted timeously to GST&A. Details of the person to be submitted to GST&A.

6.4.7 Ensure that the strategic spares status reports are submitted to GST&A by the fifth (5^{th}) working day of the following month.

PUBLIC
When downloaded from the GDS database, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.
Generation Group Documents / GMN Manual Template Rev 1 May 2008

7 Records

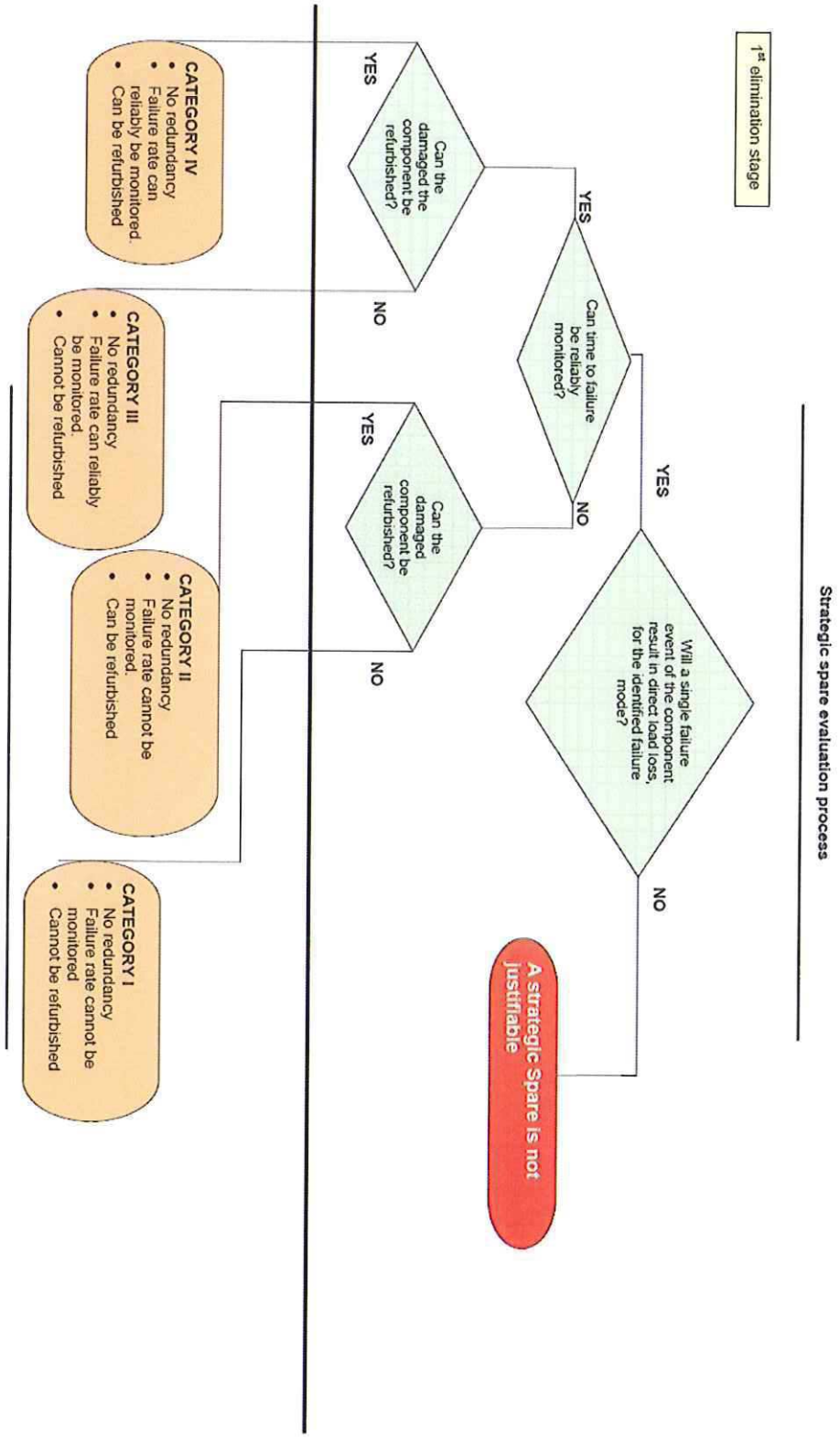
No records will be generated as a result of using this document.

8 Annexes

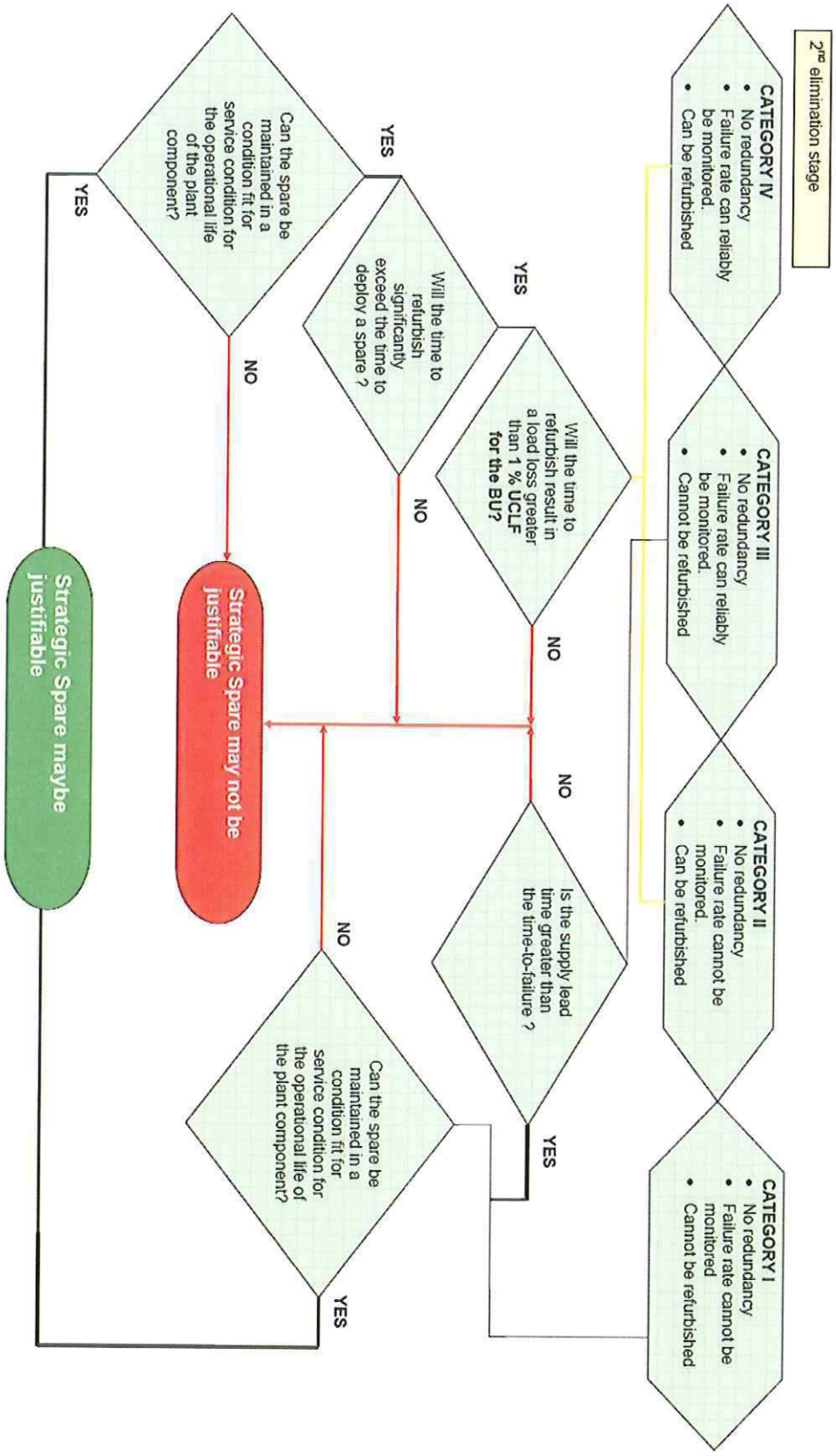
Annex A - Strategic Spares Qualification Process
Annex B - GSSHP Audit Criteria
Annex C - Key of legends for completing the Strategic Spares Status
Annex D - Examples of a "TLC"
Annex E - Recommended storage and QC inspection criteria for selected strategic spares

PUBLIC
When downloaded from the GDS database, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.
Generation Group Documents / GMN Manual Template Rev 1 May 2008

Annex A – Strategic Spares Qualification



PUBLIC
When downloaded from the GDS database, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.
Generation Group Documents / GMN Manual Template Rev 1 May 2008



When downloaded from the GDS database, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.
Generation Group Documents / GMN Manual Template Rev 1 May 2008

Annex B – GSSHP Audit Criteria for performing Internal Audits and Peer Reviews

A) Scope:

The scope of the audit and peer reviews will include all the strategic spares identified for Generation as listed in sub-Section **4.4** of this document.

B) Verification for Compliance:

1. Spare x

(Material nr)

Availability

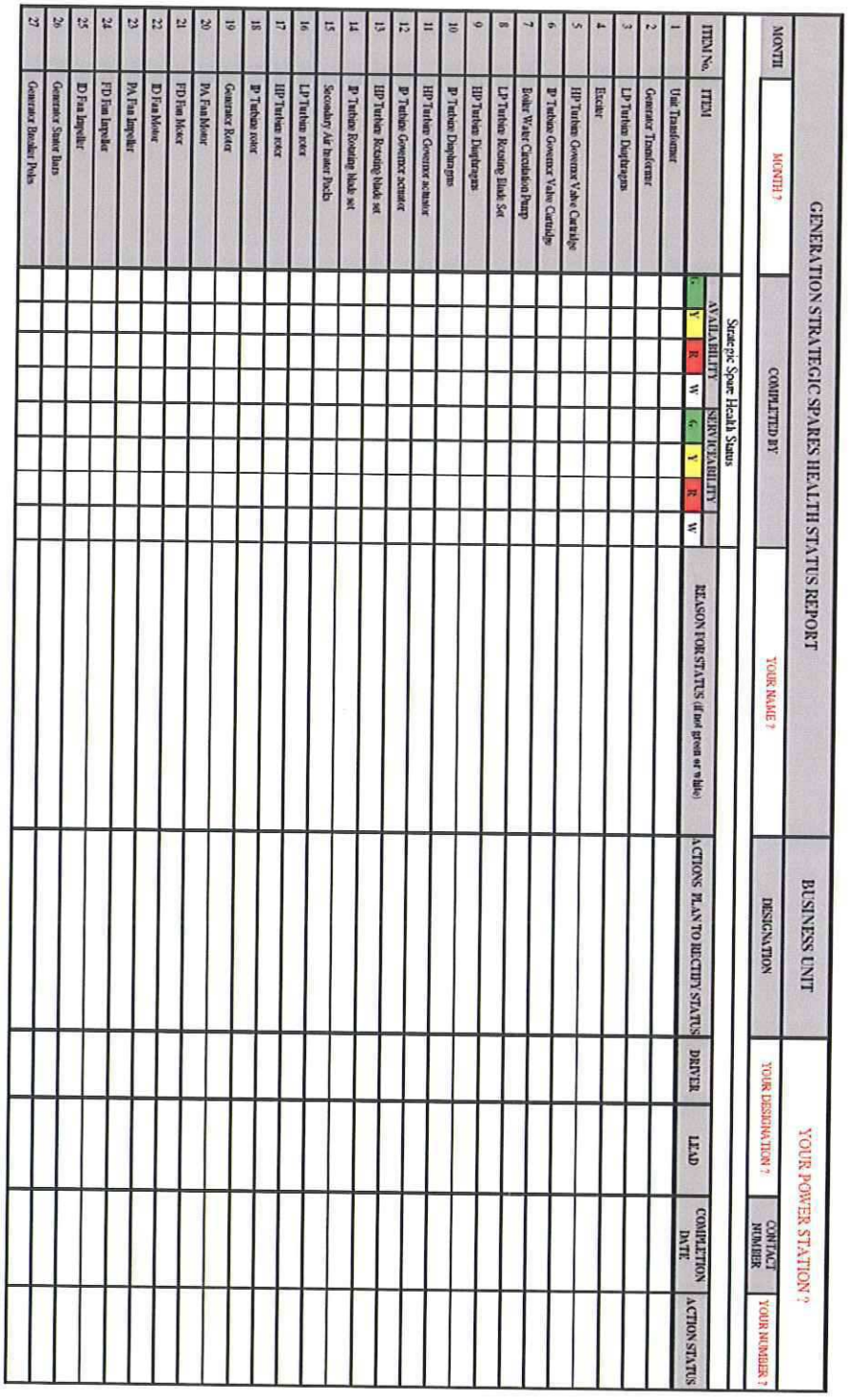
- Confirm: that status is consistent with reported
- Consistent with SAP (or equivalent)
  - In stores?
  - Location (on site or not)?
  - Status of risk/CR is documented?
  - Is it in working condition and is this documented?
  - Are there any outstanding modifications?

Serviceability

- Storage Procedure - (Does a suitable storage procedure exist?)
- Storage Execution - (Is the storage procedure being executed?)
- Maintenance Programme - (Does a suitable maintenance programme exist? Does it include condition monitoring and testing requirements ?)
- Maintenance Execution - (Is the maintenance program being executed? Are suitable records being kept for maintenance activities, condition monitoring and testing activities?)
- Protection Systems - (Status of fire protection, environmental control etc. in storage area)

PUBLIC
When downloaded from the GDS database, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.
Generation Group Documents / GMN Manual Template Rev 1 May 2008

Annex C - Strategic Spares Status Health Status Report



GENERATION STRATEGIC SPARES HEALTH STATUS REPORT

MONTH	MONTH ?	COMPLETED BY	YOUR NAME ?	BUSINESS UNIT	YOUR POWER STATION ?
				DESIGNATION	YOUR DESIGNATION ?	CONTACT NUMBER	YOUR NUMBER ?

ITEM No.	ITEM	Strategic Spare Health Status						REASON FOR STATUS (if not green or white)	ACTIONS PLAN TO RECTIFY STATUS	DRIVER	LEAD	COMPLETION DATE	ACTION STATUS
		AVAILABILITY			SERVICEABILITY								
		G	Y	R	W	G	Y	R	W						
1	Unit Transformer														
2	Generator Transformer														
3	LP Turbine Diaphragms														
4	Exciter														
5	HP Turbine Governor Valve Cartridge														
6	IP Turbine Governor Valve Cartridge														
7	Boiler Water Circulation Pump														
8	LP Turbine Rotating Blade Set														
9	HP Turbine Diaphragms														
10	IP Turbine Diaphragms														
11	HP Turbine Governor actuator														
12	IP Turbine Governor actuator														
13	HP Turbine Rotating blade set														
14	IP Turbine Rotating blade set														
15	Secondary Air heater Packs														
16	LP Turbine rotor														
17	HP Turbine rotor														
18	IP Turbine rotor														
19	Generator Rotor														
20	PA Fan Motor														
21	FD Fan Motor														
22	ID Fan Motor														
23	PA Fan Impeller														
24	FD Fan Impeller														
25	ID Fan Impeller														
26	Generator Stator Bars														
27	Generator Rotor Poles														

PUBLIC

When downloaded from the GDS database, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.

Generation Group Documents / GMN Manual Template Rev 1 May 2008

Annex D - Examples of a GSSHP "TLC"

M_02 F2010/June 09	Production 1										Production 2						Production 3									
	Ken		Kr		Maj		Mtl		Tut		Duv		Let		Mat		Ar		Hen		Cam		Gtv		Kom	
SPARE	Av.	Srv.	Av.	Srv.	Av.	Srv.	Av.	Srv.	Av.	Srv.	Av.	Srv.	Av.	Srv.	Av.	Srv.	Av.	Srv.	Av.	Srv.	Av.	Srv.	Av.	Srv.	Av.	Srv.
1 Gen Trf									CR								CR								CR	
2 Gen Trf HV Bushings																										
3 Gen Trf LV Bushings																										
4 Unit Trf																									CR	
5 Gen rotor			CR																							
6 Stator bars																										
7 LP turb rotor (bladed)					CR																CR				CR	
8 Gen breaker poles																										
9 Exciter (incl rotor)																										
10 ID fan impeller																										
11 FD fan impeller																										
12 PA fan impeller																										
13 ID fan motor																										
14 FD fan motor																										
15 PA fan motor																										
16 Gov valve spindles, HP																									CR	
17 Gov valve spindles, IP																										
18 Steam feedpump cart					CR																					
19 Stm fdpmp turb blades																										
Number of REDS	3	3	2	8	9	14	2	4	5	5	5	9	0	0	6	5	6	6	2	5	5	9	18	19	6	10
March 07 (No. REDS)	3	10	4	7	3	3	3	10	6	7	6	6	8	11	6	11	4	6	4	5	4	17				

Notes

a) Spare 18 refers to ELECTRICAL feedpump cartridges for Matimba and Kendal

b)

Serviceability

All 8 sub-criteria OK.

6 or 7 sub-criteria OK (including no outstanding mods.)

5 or fewer sub-criteria OK

Note: If Availability = RED, then Serviceability = RED

Permanently not applicable at this station.

Annex E:
Recommended storage and QC inspection criteria for selected strategic spares (as per 36-1042, Material Control, Preservation & Storage Handling)

Table 1: Minimum storage and QC inspection requirements

Component	Minimum storage and QC inspection requirements
Generator and exciter rotor (with CRR's)	**Minimum storage requirement** ➢ CRR storage as per GGS 0700. ➢ Store in clean, dry, vibration free environment away from direct sunlight above dew point temperature recommended by the OEM. ➢ Avoid contact with harmful products as per GGSS 1181 Specification ➢ Seal in suitable plastic which will limit halogens and chlorides in contact with rotor to < 200 ppm with inert gas and silica gel or apply heating elements to mitigate corrosion or stress corrosion cracking risk using dust cover. ➢ Store in crate or use suitable barrier to minimise inadvertent damage or uncontrolled access. Alternatively, store in "bullet" and pressurise to seal from atmosphere with suitable pressure gauge to detect air ingress. ➢ Use support arrangement designed to counter risk of bowing. ➢ Inspect twice a year?
	Minimum technical refurbishment scope before storage ➢ Refurbishment of generator rotor as per GGS 0391/2/3. ➢ Testing of generator rotor as per GGS 0684. ➢ Partial discharge testing as per GGM 0826. ➢ CRR inspection and refurbishment as per GGS 0700. ➢ Refurbishment history updated.

PUBLIC
When downloaded from the GDS database, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.
Generation Group Documents / GMN Manual Template Rev 1 May 2008

Component	Minimum storage and QC inspection requirements
Draught group motors	**Minimum storage requirement** ➢ Store in clean dry, vibration free environment. ➢ Protect shaft couplings, shaft extensions, exposed keyways and other unpainted areas with anti-rust preparation. ➢ Clean externally. ➢ Ensure adequate oil or excess grease in bearings. ➢ Monthly turn shaft through 90 degrees (only if there are rolling element bearings fitted). ➢ Conduct visual inspection quarterly. ➢ Megger test HV motors quarterly.
	Minimum technical refurbishment scope before storage ➢ Refurbishment as per GGS 0389. ➢ Refurbishment history updated.
Draught group fan impellers	**Minimum storage requirement** ➢ Coat bearing surface with anti-rust preparation. ➢ Store in clean, dry environment ➢ Conduct quarterly visual inspection. ➢ Rotate the impeller and shaft through 180 degrees every 6 months. Applicable where the impeller and shaft are stored as an assembly, supported by trestles under the shaft
	Minimum QC technical inspection scope before storage ➢ Full NDT examination as per GGP 0322. ➢ Dimensional measurement using check sheet. ➢ Refurbishment history updated.
Generator and unit transformer (with HV & LV bushings)	**Minimum storage requirement** ➢ Prolonged storage of key stock Transformers as per ESKASAAI3 – Storage method 3 ➢ Ensure oil dielectric strength conforms to ESKASAAF1. ➢ Inspect quarterly.

PUBLIC
When downloaded from the GDS database, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.
Generation Group Documents / GMN Manual Template Rev 1 May 2008

Component	Minimum storage and QC inspection requirements
	Minimum QC technical inspection scope before storage ➢ Refurbishment as per GGG 1055. ➢ Quarterly inspection according to GGS 0178 Standard. ➢ Refurbishment history updated.
Main turbine Control Valves	**Minimum storage requirement** ➢ Store in clean, dry environment on pallets, shelving or racks on concrete floor. ➢ Protect shaft, valve head, exposed keyways and other unpainted areas with anti-rust preparation.
	Minimum QC technical inspection scope before storage ➢ Refurbishment as per GGS 0580. Standard. ➢ Refurbishment history updated.
Generator breaker (including poles) **Generator breaker (including poles**	**Minimum storage requirement** ➢ Store in clean, dry environment on pallets, shelving or racks on concrete floor.
	Minimum QC technical inspection scope before storage ➢ All spare poles must be complete and stored fully assembled, with top and side covers fitted. It is not required to store the spare poles in a fully serviceable state. All components required to ensure availability of the power generating unit must be serviced before utilisation. ➢ Refurbishment as per GGPP 0965. ➢ When items are scavenged from any of the spare poles to ensure the availability of a power generating unit, these items must be replaced within six months of removal. ➢ Business unit responsible for spare pole to conduct inspection as per check sheet to verify pole completeness. ➢ Refurbishment history record updated. ➢ Annual audits to be conducted.

PUBLIC
When downloaded from the GDS database, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.
Generation Group Documents / GMN Manual Template Rev 1 May 2008

Component	Minimum storage and QC inspection requirements
Stator bars	**Minimum storage requirement** ➢ Store bars in crate in clean, dry environment on flat surface. ➢ Bars to be sealed in plastic with inert gas to avoid moisture ingress. ➢ Bars to remain in wooden crate with packaging until required in plant. ➢ Buffer elements to separate bars from each other.
	Minimum QC technical inspection scope before storage ➢ Dimensional and material checks to be performed to ensure that the winding copper meets the necessary electrical and mechanical requirements. ➢ Stator bars are tested in accordance with BS4999-144.

PUBLIC
When downloaded from the GDS database, this document is uncontrolled and the responsibility rests with the user to ensure it is in line with the authorised version on the database.
Generation Group Documents / GMN Manual Template Rev 1 May 2008