London Underground Safety Certificate and Safety Authorisation Document

Transport for London
London Underground

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Revision Control

London Underground (LU) has maintained an approved Railway Safety Case since 1995 in accordance with the Railways (Safety Case) Regulations. Following the introduction of the Railways and Other Guided Transport Systems (Safety) Regulations in April 2006, LU's application for Safety Certification and Authorisation was approved by the Office of Rail Regulation in March 2007. The Safety Certification relates to train operation and the Safety Authorisation covers stations and infrastructure operation. The Safety Certificate and Safety Authorisation document (March 2007) replaced LU's Railway Safety Case (Version 4.0).

Overall Changes

Revision Number	Date	Changes
V2 (as Version 2.00)	January 2012	Five year renewal of LU's Safety Certificate and Safety Authorisation

Glossary

a. Abbreviations

b. Terms and definitions

a. Abbreviations

A	
AAMP	Annual Asset Management Plan
AC	Alternating Current
ALARP	As Low As Reasonably Practicable
APD	Asset Performance Director/Directorate
ASLEF	Associated Society for Locomotive Engineers and Firemen
ATO	Automatic Train Operation
ATP	Automatic Train Protection (Signalling)
B	
BCDM	Business Case Development Manual
BCV	Bakerloo, Central, Waterloo & City and Victoria lines
C	
C2C	c2c Rail Limited
CAN	Corrective Action Notice
CCEP	Congestion Control and Emergency Plan
CCTV	Closed Circuit Television
CDM	Construction (Design and Management) Regulations 2007
CEPS	Central Emergency Power Supply
CIRAS	Confidential Incident Reporting and Analysis System
COO	Chief Operating Officer
CPD	Capital Programmes Director/Directorate
CRA	Customer Risk Assessment
CRCL	Chiltern Railway Company Limited
D	
DC	Direct Current
DLR	Docklands Light Railway
DRACCT	Director's Risk, Assurance and Change Control Team

E	
E/B	Eastbound
ERNs	Engineering Regulatory Notices
EWSA	Engineering Works and Safety Arrangements
F	
FIR	Formal Investigation Report
G	
None.	
H	
HR	Human Resources
HRS	Human Resource Services
HSE	Health, Safety & Environment
HSEMS	Health, Safety and Environmental Management System
I	
None.	
J	
JNP	Jubilee, Northern and Piccadilly lines
K	
None.	
L	
LBSL	London Bus Services Limited
LGM	Line General Manager
LFEPA	London Fire and Emergency Planning Authority
LOROL	London Overground Railway Operations Limited
LU	London Underground
LUCAS	London Underground Combined Access System
LUSEA	London Underground Safety and Environmental Analysis database
M	
None.	
N	
NOC	Network Operations Centre
O	
OLBI	Off Line Battery Invertor
OPO	One Person Operated

ORR	Office of Rail Regulation
P	
PAS	Publicly Available Specification
PCROs	Power Control Room Operators
PFI	Private Finance Initiative
PGI	Planned General Inspection
PPP	Public Private Partnership
PMF	Project Management Framework
Q	
QRA	Quantitative Risk Assessment
QUENSH	Quality, Environmental, Safety and Health Conditions
R	
RAIB	Rail Accident Investigation Branch
RDO	Rostered Duty Officer
RIDDOR	Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995
RMT	Railway, Maritime & Transport Union (Formerly NUR)
ROGS	Railways and Other Guided Transport Systems (Safety) Regulations
RSSB	Rail Safety and Standards Board
RUB	Rail and Underground Board
S	
SABRE	Station Access Booking Railway Engineering
SAP	An enterprise management information system which manages procurement, HR functions, Duty Allocation, payrolls etc.
SCADA	Supervisory Control and Data Acquisition (computer-based system)
SCAT	Speed Control After Tripping
SIP	Safety Improvement Plan
SKPIs	Safety Key Performance Indicators
SMS	Safety Management System
SPAD	Signal Passed At Danger
SSEs	Shift Supply Engineers
SSR	Sub-Surface Railway (Circle, District, Hammersmith & City and Metropolitan lines)
SWT	South West Trains Limited
T	
TANC	Temporary Approved Non Compliance

TOC	Train Operating Company
TfL	Transport for London
TOM	Train Operations Manager
TSSA	Transport Salaried Staffs' Association
U	
UPS	Uninterruptible Power Supply
V	
none	
W	
W/B	Westbound
WRA	Workplace Risk Assessment
X	
none	
Y	
none	
Z	
none	

b. Terms and definitions

A

Accountability - Assigned to the person who has the ultimate responsibility for completion of the activity to the required standard and has the authority to veto. Within LU, this authority resides with the appropriate Executive Director.

ALARP - Under UK legislation, LU is required to do whatever is reasonably practicable to reduce the health and safety risks to its employees and others affected by its operations; in other words, risks must be reduced to a level which is as low as reasonably practicable (ALARP). The term reasonably practicable means that safety measures should be undertaken unless the cost, in terms of money, time and trouble, is grossly disproportionate to the safety benefit, which is expressed in terms of the value of the risk averted by the safety measure.

Asset - An item of property owned or leased by LU.

Asset Life Cycle - The life of an asset can be represented by a series of stages commencing with identification of need through specification, design, manufacture or construct, install, commissioning (sometimes included with installation), operate and maintain (the service life) and ending with withdrawal and disposal. This is one cycle of the asset life cycle. Assuming continued requirement for an asset the commissioning stage of a second life cycle will coincide with withdrawal of the asset used in the first life cycle.

Asset Management - Asset Management is the way assets (such as trains, signals, stations and tunnels) are managed throughout their life to achieve the right balance of cost, performance and risk for the organisation. Asset Management covers demand analysis, asset acquisition, operation, maintenance and renewal/disposal and follows a plan, do, check, act process.

Automatic Train Operation - The subsystem of automatic train control, responsible for the automatic driving of trains.

B

None

C

Category 1 Standard - A standard which is owned by LU, mandatory on LU and members of the LU Group.

Category 2 Standard - LU or Tube Lines standards which support LU's requirements stated within Category 1 Standards. They are usually a process or asset related standard.

Category 5 Standard – An LU standard which is mandatory within LU only.

Client (under CDM Regulations) - Any person for whom a project is carried out, whether it is carried out by another person or is carried out in-house.

Competence – A combination of practical and thinking skills, knowledge, experience, fitness and behaviour.

Contractor - A company, firm, person, supplier, consultant, sub-contractor, agent or stockist, providing goods, materials or services. Contractors may be company employees.

D

None.

E

Earth Faults - Earth faults that occur when an electrical conductor comes into contact with an electrical earth.

Emergency - An undesired event which has life threatening and/or extreme loss implication and requires immediate action.

Engineering Hours - The period of time between the published time or actual time, if later, traction current is switched off **and** the published time or amended time, if earlier, traction current is switched on. Note therefore that Engineering Hours cannot be extended.

Environment - Surroundings in which an organisation operates, including air, water, land, natural resources, flora, fauna, humans and their interrelation.

F

Formal Investigation - A Formal Investigation aims to identify underlying causes of an incident and to make recommendations to address these causes, any contributory factors, and any issues relating to managing incidents and business recovery. The recommendations are included in a report which is circulated widely and formally held within the Company and is reviewed by DRACCT.

G

None.

H

None.

I

Incident - An undesired event that results in, or under slightly different circumstances could have resulted in, harm to people, damage to property, damage to the environment, or loss of process.

Infrastructure Manager – Has the meaning ascribed to it by the Railways and Other Guided Transport Systems (Safety) Regulations.

Interlocking Machine Rooms - A large signalling equipment room which houses the equipment associated with the signalling interlocking system.

J

None.

K

None.

L

LU Group - LU, Tube Lines, PFI suppliers and other suppliers.

LU network - The geographic extent of the services provided by London Underground.

LUCAS - London Underground Combined Access System (LUCAS) is the membership and Smartcard scheme for Engineering and Construction workers on London Underground.

M

None.

N

None.

O

None.

P

Performance Management - The means by which performance measures are defined and set, and against which a comparison of actual vs. planned/targeted performance can be continuously monitored.

PFI Supplier - A supplier providing services to LU under the terms of a Private Finance Initiative contract.

Points - A mechanical installation enabling vehicles to be guided from one track to another at a junction. Points can be either mechanically powered or hand-worked.

Possession - A designated section of track where a Possession Master has control. Unauthorised train movements into the section are prevented by the arrangements shown in the Possession Standards.

Possession Master - A person certificated by LU to take control and give up a possession in order to carry out engineering and similar work.

PPE (Personal Protective Equipment) - All equipment designed to be worn or held to protect against hazards likely to endanger safety and health at work, or any addition or accessory designed to meet this objective.

PPP Supplier – The supplier providing services to LU under the terms of the Public-Private Partnership contract, i.e. Tube Lines.

Principal Contractor - This is the contractor appointed by the client who has the overall responsibility for the management of site operations. This includes the overall co-ordination of site health and safety management. Has the meaning ascribed to it in the Construction (Design and Management) Regulations.

Project Manager - The person nominated for the activity or work to manage, co-ordinate, and bring it to a satisfactory completion.

Protection Master - A person certificated by LU to provide protection for him/herself and others on or about the track during Traffic Hours or Engineering Hours. The Protection Master's certificate will be endorsed to show Traffic Hours or Engineering Hours or both.

Q

None.

R

Railway Group - Organisations that are bound to comply with Railway Group Standards.

Railway Group Standards - Standards mandated by Railway Safety and Standards Board (RSSB) for use by organisations that operate on or support the operations of Network Rails' infrastructure.

Responsibility - Normally assigned to the person who undertakes the activity, the 'doer'. The person may delegate the task or a part thereof to another or contract the work to a third party, but retains responsibility for the outcome.

Risk Profile - A graphical representation of LU's 'Top Events'.

S

Safe System of Work - A set of controls which result from a risk assessment on a task. It defines safe methods to ensure that risks are reduced to as low as reasonably practicable.

Safety Key Performance Indicators - Specific measures by which safety performance and progress against safety objectives can be monitored.

Special Event - An event which is known about in advance, including those organised and managed by an outside party or outside parties, which requires LU to plan for any alteration to operational arrangements; for example the Notting Hill Carnival, or a Royal Wedding.

Specification - Documents defining requirements to be satisfied by equipment, systems or services, and the methods by which compliance with the requirements shall be verified. Specifications are produced for inclusion in purchasing documents or contracts, which may be internal or external.

Speed Control After Tripping (SCAT) - A system ensuring that a train can only proceed at slow speed for a defined period of time after tripping past a signal at danger and resetting the tripcock.

Station Control Room - Room on a station from which the station is controlled on a minute by minute basis.

Substation Breaker - A circuit breaker which is used to isolate AC/DC electrical supplies.

Sub-suface Station – A station where the ceiling above the station platform is below the adjacent surface level and where the ceiling encloses more than half the length of the platform. These stations are regulated by the Fire Precautions (Sub-surface Railway Stations) Regulations 2009.

Surface Station – A station which is not in scope of the Fire Precautions (Sub-surface Railway Stations) Regulations 2009.

Surface Stock - Rolling Stock, which through the structure gauge employed in its design, cannot operate through tube tunnels.

System Risk - The totality of all safety risks to customers, employees, suppliers, other railway operators and other third parties that arise due to LU operations. This includes risks imported by customers and other third parties.

T

The Plan – the annual plan which sets out London Underground's and London Rail's major change programmes and milestones for the coming year. It includes the corporate and director level scorecards. It supports the LU Business Plan which defines the priorities and programmes to be delivered over the years through to 2020/21.

Top Event - LU's major hazards as identified by the LU Quantified Risk Assessment.

Track Gauge - The distance between the running edges of the two running rails on the same track.

Traction Current - Electrical supply to third and fourth conductor rail system.

Traction Current Rails - (Also known as conductor rails) – A rail carrying traction current as part of the electrical circuit to/from the trains.

Trade Union Health and Safety Representative - An individual elected by a Trade Union to represent their members, or non-union members they have agreed to represent, on health, safety and welfare matters. Their responsibilities are governed by the Safety Representatives and Safety Committee Regulation 1977 (as amended by the Management of Health & Safety at Work Regulations 1992).

Transport Undertaking – Has the meaning ascribed to it by the Railways and Other Guided Transport Systems (Safety) Regulations.

Traffic Hours - The period between the published time or amended time, if earlier, traction current is switched on and published time or actual time, if later traction current is switched off. On non-electrified tracks and tracks within depots or sidings where traction current is normally on at all times, trains could move at any time and in any directions.

Train Arrestors - A device designed to decelerate a slow moving train so as to minimise the risk of damage to the train and injury to staff and customers should it overrun the correct stopping position at a terminal location.

Train Master - A person, certified by LU, to supervise and control the movement of engineer's trains or mechanised vehicles at a site of work.

Trainstops - A track side device adjacent to a signal which interacts with the tripcock arm to stop the train, should the train attempt to pass a signal at danger.

Tripcocks - A device attached to the leading right hand side of the leading bogie of a train, operated by an arm which when pushed back by a train stop in the up position, causes the automatic operation of the train's emergency brakes by the loss of train line air or round the train circuit.

Tube Stock - Rolling stock, which through the structure gauge employed in its design, is capable of operating through tube tunnels.

U

None.

V

None.

W

WoCRA - The Workplace and Customer Risk Assessment database which stores all current and archived workplace and customer risk assessments.

X

None.

Y

None.

Z

None.

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Section 0: Foreword

Contents

0.1 Duty Holder

The Duty Holder of this Safety Certification/Safety Authorisation is:

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Telephone: 0207 222 5600

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All queries and correspondence regarding this document should be sent to:

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55 Broadway

London

SW1H 0BD

This application for non-mainline Safety Certification and Safety Authorisation was accepted by the Railway Safety Directorate of the Office of Rail Regulation (ORR) in February 2012.

This document is available to the public on the Transport for London website (www.tfl.gov.uk).

To the extent permitted by law, no liability is accepted by London Underground or any of its associated companies (present and future) for any loss or damage arising from the use of this document for any other purpose.

0.2 ROGS/Assessment Criteria Mapping Document

Safety Certificate and Safety Authorisation document – Assessment criteria

The table below sets out the Office of Rail Regulation's assessment criteria for safety certification and safety authorisation applications made under the Railways and Other Guided Transport Systems (Safety) Regulations (ROGS) and the section of this document which addresses the various criteria.

NTU = ROGS Train Operator Criteria

NIM = ROGS Infrastructure Manager Criteria

NTU/NIM criteria	LU section
NTU Criteron 1: Type and extent of operation ▪ Information about the broad nature of the operation (i.e. passenger, freight; suburban, intercity, rural etc.); ▪ The geographical boundaries of the operation possibly including a map; ▪ Details of ownership of the company (where relevant, identifying any other duty holders within the same group of companies who have a Safety Certificate or Safety Authorisation); ▪ Approximate numbers of total employees (including contractors), and of safety critical staff; ▪ The interfaces with other railway operators; ▪ Type of trains/vehicles, size of fleet, nature of freight (tonnage of loads, classes of dangerous goods etc.), typical number of daily movements; passenger journeys per year or (freight operations) train miles per year. **NIM Criterion 1: Particulars of the Infrastructure** As above, plus: ▪ Length of track; ▪ Type of signalling equipment and control systems; ▪ Features or structures which have a bearing on safe operation e.g. level crossings, significant rail junctions, stations, tunnels etc. These should be listed by category only, unless there are exceptional risk factors associated with them when they should be referred to individually, with an indication of what those risk factors are.	Section 1 of the LU application describes the scope of LU's operations in terms of its combined role as Infrastructure Manager (infrastructure and station operator) and Train Operator for the LU network. It includes details on employees, ownership, the network and the train fleet. Section 12 sets out interfaces with other railway operators. Details on train operations are contained in Section 1. Further information on rolling stock is available in Section 14.
NTU Criterion 2: Safety management system overview **Expected evidence** ▪ A copy of the applicant's safety policy statement, which has been approved and signed by the Chief Executive together with a description of how this policy has been communicated to all employees; ▪ Reference to any recognised model which the SMS adheres to or links with other recognised management	LU is a vertically integrated organisation and is a Train Operator and an Infrastructure Manager in terms of station operations and infrastructure. LU's Management System covers all activities and, therefore, is the reference point for NTU criterion 2 and NIM criteria 2 and 16.

requirements or principles; e.g. MHSWR 1999 ACOP, HSG65; BS 8800; OHSAS 18001; ▪ Details of where and how the SMS is documented including references to supporting documentation (actual copies are not required); ▪ An organogram showing the applicant's SMS structure, allocation of roles and responsibilities; **and** Brief descriptions of: ▪ How the SMS is integrated with other management activities; ▪ How those with a role in the management of safety are held accountable for their performance; ▪ How employees and their representatives at all levels within the applicant's company are involved in the SMS, where appropriate this should include reference to volunteer workers; ▪ How safety performance is monitored and identified shortcomings are rectified; ▪ How new safety developments, lessons learnt from incidents etc. are implemented. **NIM Criterion 2: Safety Management System Overview** As above	Section 2.1 and 2.2 set out LU's top level organisation and the main safety accountabilities Governance is set out in Section 2.3 Section 2.4 explains the document framework arrangements and the structure of LU's Management System, including how we manage non-compliance Communication of LU's HSE Policy is described in Sections 2 and 9. A copy of the HSE Policy is included as Annex 2A. Section 2.5 describes the main components of LU's Health, Safety & Environment Management System, the models on which it is founded and how it fits into LU's Management System Section 2.6 describes LU's consultation process Section 2.7 describes HSE monitoring and LU's approach to improving performance New safety developments are covered in Section 6.5 Section 10.4 describes how lessons learnt from incidents are learnt Sections 1.11 and 1.12 describe LU's arrangements for the supply and control power and control of access to LU infrastructure.
NTU Criterion 3: Legislative requirements **Expected evidence** The applicant should provide evidence that it is aware of its statutory responsibilities applying to its operation. The format in which this information is presented is at the discretion of the applicant, but it must be structured and straightforward to reference. Preferably, this should be grouped into functional categories relevant to the operation (e.g. initial integrity, operations, maintenance, contractors, emergency management, new projects, health and safety of employees etc.) With reference to information provided in criterion 2, the applicant should then show how compliance is ensured by the safety management system, stating where any relevant overarching managerial responsibility lies.	LU's arrangements for the identification of legislative obligations are described in Section 3.

NIM Criterion 3: Legislative requirements As NTU Criterion 3	
NTU Criterion 4: Control of all categories of risk and risks arising from activities by other persons **Expected evidence** A summary of: ▪ How the applicant identifies risks associated with its operations; ▪ How it identifies risks arising from the activities of 'other persons'; ▪ How it selects the appropriate method of risk assessment; ▪ How it goes about controlling risk in terms of selecting appropriate risk mitigation measures, devising and implementing management procedures and providing appropriate training; ▪ Particular arrangements and procedures for controlling risk from the supply of maintenance and material and the use of contractors; and ▪ Systems for monitoring the effectiveness of risk management arrangements. **NIM Criterion 4: Control of all categories of risk and risks arising from activities by other persons** As NTU Criterion 4	Section 4 describes how risk is managed and controlled. This includes risks arising from LU's activities and interfaces with other operators. Section 4.4 describes the different risk assessment methods used by LU. Section 4.2 describes how LU controls risk, including safety decision making. Sections 4.2 and 4.4 describe the management process for risk assessments and relevant training/competence. The monitoring and audit of the effectiveness of risk control measures is described in Section 2.7 (HSE monitoring) and Section 11 (Safety /Technical Audit and Review).
NTU Criterion 5: Procedures to meet technical specifications and for operations and maintenance **Expected evidence** Summary information on the technical specifications and procedures relating to operations and maintenance that are relevant to the safety of the applicant's transport system. These specifications and procedures do not need to be individually listed but should be grouped under suitable headings indicating their source and status. Details of the SMS should outline: ▪ The system by which procedures are produced and subsequently monitored, with particular reference to how these are applied throughout the lifecycle of any relevant equipment or operation; ▪ How the SMS delivers corrective action when it is found that specifications and/or procedures are not being adhered to.	Section 5 describes how LU's systems for ensuring safety, operational and technical requirements are managed and communicated effectively. The standards management processes that support this are described in Section 2.4 (LU Management System). Safety and technical audit is described in Section 11.
NTU Criterion 6: Targets **Expected evidence** ▪ A brief description of the process for setting targets, including whether this takes into account any industry	Section 6 explains how LU sets targets and ensures that plans are developed for the achievement of targets. Details are provided of processes for monitoring and responding to

wide or national targets; ▪ Reference to the company documents which list and describe targets; ▪ Brief explanation of how the SMS ensures that plans for meeting targets are put into action, including what action is taken when a target is not met, or it becomes apparent that it will not be met. **NIM Criterion 5: Targets** As NTU Criterion 6, plus ▪ Where transport undertakings operating on their infrastructure are independently controlled, an indication of how this process takes into account the effect of their operations.	performance in relation to these targets.
NTU Criterion 7: Control of new risks **Expected evidence** Aims of the change management process; **and** Summary of: ▪ The scope of changes to which the process applies; ▪ Arrangements for promoting awareness of and ensuring use of the change management process; ▪ The procedures and methods used to evaluate new risks and implement new control measures; ▪ Process for validation of a change before it is introduced and checking it afterwards. **and** ▪ A statement that a written safety verification scheme exists as required in relation to Reg 6(1)(c)(iii) and 6(4), which contains the elements set out in Schedule 4 of the regulations; ▪ Reference to the documentation which contains details of the scheme; ▪ Details of the 'competent person' for the purpose of undertaking safety verification, where one has been appointed. **NIM Criterion 7: Control of new risks** As NTU Criterion 7, plus ▪ Summary of how the procedures take into account the effect of any changes that are made in the operations of other transport undertakings.	Section 7 describes LU's arrangements for the management and control of change and the assessment of new risks. This includes the scope, awareness raising, processes for assessing risks and validation. Section 7.7 (Safety Verification) describes LU's safety verification processes, the documents which set out the process and designation of LU's Independent Competent Person.
NTU Criterion 8: Training and maintenance of competence **Expected evidence** Summary of: ▪ Roles in the company with main responsibilities for ensuring training and maintenance of competence;	Section 8 describes staff recruitment and retention, performance management, training, record keeping, managing working hours and LU's Competence Management System. Section 8.9 describes how LU

▪ The processes for recruitment, training, assessment, competence monitoring and record-keeping, indicating how all these contribute to achieving and maintaining competence; ▪ The system which ensures that tasks with a safety element, including safety critical tasks, are identified; ▪ The arrangements which ensure that staff comply with their training and work instructions. If the applicant has a formal Competence Management System (CMS) points 1 and 2 can be addressed by stating the aims of the CMS and describing its structure, showing where overall responsibility has been assigned at senior management level. **NIM Criterion 8: Training and maintenance of competence** As NTU Criterion 8.	manages safety critical work.
NTU Criterion 9: Safety information **Expected evidence** Summary of: ▪ Arrangements and procedures for the provision of safety information within its own operation. These should cover the receipt, identification, selection, dissemination and recording of information, and method and formatting of relevant documentation. It should also describe how any changes to existing information are controlled; ▪ Arrangements for the provision of safety information between it and other transport operators, including those applying for a certificate or authorisation for operations on the same infrastructure; ▪ Arrangements for the layout of vital safety information and how changes to this information are managed. **NIM Criterion 9: Safety information** As NTU Criterion 9.	Section 9 describes the LU arrangements for communication of health, safety and environment information, including safety critical information with employees and third parties.
NTU Criterion 10: Accidents, incidents, near misses and other dangerous occurrences **Expected evidence** Summary of: ▪ Procedures for reporting, investigation and analysis of accidents, incidents, near misses and other dangerous occurrences; this should cover procedures for reporting those accidents and incidents which are statutorily reportable to ORR and RAIB; ▪ Allocation of resources, and the training provided to those carrying out investigations; ▪ Procedures for: ▪ Implementing actions required by ORR following an official (RAIB and/or ORR) investigation;	Section 10 describes the LU arrangements for emergency planning, incident response and the reporting and investigation of incidents. Section 10.4 describes procedures for implementing actions from LU, ORR or RAIB investigations.

▪ Reviewing reports of accidents, incidents, near misses and dangerous occurrences received from all other sources, including employees, other transport operators, members of the public; ▪ Considering and implementing preventative measures following analysis and review of relevant information from all sources other than when directly mandated by ORR. **NIM Criterion 10: Accidents, incidents, near misses and other dangerous occurrences** As NTU Criterion 10, plus ▪ How the investigation process takes into account any effects arising from the operations of transport undertakings.	
NTU Criterion 11: Emergency planning **Expected evidence** An overview of: ▪ The types of emergency covered; ▪ The information supplied by the applicant to enable the Emergency Services to plan their response to a major accident on the railway, where appropriate referring to duties under the Civil Contingencies Regs; ▪ Those specific aspects of the SMS that are directly relevant to the emergency response arrangements, e.g. training for emergencies and testing of emergency plans; ▪ The plans, roles & responsibilities, training and arrangements to maintain competence, and the arrangements for effective communications. **NIM Criterion 11: Emergency planning for Infrastructure Managers** As above, plus: ▪ How the infrastructure manager co-ordinates its procedures with those of the transport undertakings using its infrastructure and any other infrastructure manager, with which it has an interface.	Section 10 describes the LU arrangements for emergency planning, incident response and the reporting and investigation of incidents.
NTU Criterion 12: Audit **Expected evidence** An overview of: ▪ Arrangements for the internal audit of the SMS and main risk control systems; ▪ How audit findings are used to bring about improvement in the SMS (where relevant evidence is given to fulfil criterion 2, this may be cross-referenced); ▪ Arrangements for regular reviews of the SMS carried out with a view to facilitating its continuous improvement. Audit is here taken to mean a process by which the adequacy of the management system itself is assessed, providing	Section 11 describes the LU arrangements for safety and technical audit and the LU arrangements for the periodic review of its Health, Safety and Environment Management System.

evidence for a review of its structure and high level functions. This excludes routine monitoring arrangements for ensuring compliance with company procedures and standards. **NIM Criterion 12: Audit** As NTU Criterion 12.	
NTU Criterion 13: Co-operation **Expected evidence** An overview of: ▪ How the applicant communicates its safety needs to the infrastructure manager(s), including those for meeting statutory provisions, technical standards and specifications, and other requirements arising from its safety management system; ▪ The liaison and cooperation arrangements between the applicant and the infrastructure manager for managing interface risks, including procedures for resolution of disputes; ▪ The arrangements for liaising and cooperating with other transport undertakings operating on the same infrastructure. **NIM Criterion 6: Co-operation and arrangements for transport undertakings to operate safely on the infrastructure** **Expected evidence** An overview of: ▪ How the infrastructure manager accounts for the safety needs of transport undertakings; ▪ How the infrastructure manager determines the safety needs of transport undertakings for meeting legislative requirements, technical standards and specifications and the requirements of their own safety management systems; ▪ The liaison and cooperation arrangements between the infrastructure manager and transport undertakings for managing interface risks, including procedures for resolution of disputes; **and** The above (for NTU and NIM criteria) should include reference to: ▪ Relevant agreements or industry norms which govern these relationships; ▪ Documents which give details of the agreements reached through these relationships.	Section 12 describes the interfaces that LU has with all other parties, including suppliers and other transport undertakings, and the arrangements we have established for cooperation.

NTU Criterion 14: Types of work and compliance with legislative requirements **Expected evidence** ▪ A list of categories of work with a safety element required for the applicant's operation; ▪ A summary of how its arrangements for managing competence are designed to ensure that such work is carried out in accordance with relevant legislative requirements, referring to evidence provided under criterion 8.	Section 8 describes LU's arrangements for competence management, safety critical work and medical fitness.
NIM Criterion 14: Safe design of the infrastructure **Expected evidence** The aims of the organisation in its various design processes; ▪ An overview of the arrangements for meeting statutory requirements, and for participating in industry processes (including taking account of the equipment or operations of other applicants). This overview should describe links between the arrangements and other relevant parts of the safety management system; ▪ An overview of any national or international standards, or suites of standards relevant to the operation with which the organisation seeks to comply in designing its infrastructure; ▪ Reference to any other types of design requirements e.g. Company standards, technical specifications and procedures; ▪ Reference to relevant parts of the applicant's SMS; ▪ A brief explanation of how the organisation has satisfied itself that designs which predate current standards are fit for purpose.	Section 13 describes LU's asset management system, including asset design, maintenance, operation and disposal. It describes how LU delivers, manages its own assets and how it ensures that assets managed by others are managed effectively. Section 13 also describes LU's assurance process, how assets whose designs predate current standards are managed and how LU manages non-compliance with standards. Section 2 describes the LU Management System within which the asset management system sits.
NIM Criterion 15: Safe maintenance of the infrastructure **Expected evidence** ▪ The aims of the maintenance regime; ▪ An outline of how the organisation delivers those aims safely, referring where appropriate to elements of the SMS; ▪ Reference to recognised industry maintenance standards which have been adopted, and to relevant company standards and procedures; ▪ An overview of the way in which the standards and procedures are maintained; ▪ A brief explanation of the organisation's tolerance of non-compliance to maintenance standards.	Section 13 describes LU's asset management system, including asset design, maintenance, operation and disposal. It describes how LU delivers manages its own assets and how it ensures that assets managed by others are managed effectively. Section 13 also describes LU's assurance process, how assets whose designs predate current standards are managed and how LU manages non-compliance with standards. Section 2 describes the LU Management System within which the asset management system sits.

NTU Criterion 15: Types of rolling stock and compliance with legislative requirements **Expected evidence** The applicant should: ▪ List all types of rolling stock used in its operation (where the number of types or sub-types would make this cumbersome, reference to broad categories would be sufficient); ▪ List any relevant statutory requirements that apply in respect of the design of each type; ▪ List any relevant statutory requirements that apply in respect of the maintenance of each type; ▪ Refer to maintenance plans for each type/broad category; ▪ Denote the type of formal safety scheme which the rolling stock has been subject to, for first placing into service; ▪ Briefly describe systems and procedures for safely bringing into service modified, upgraded or renewed rolling stock where not subject to any formal scheme.	Section 14 describes LU's rolling stock and the arrangements for approvals for operation over LU infrastructure. Section 13 describes LU's processes for design and maintenance (to specific standards). Section 13 also describes LU's assurance process, how modified, upgraded and renewed rolling stock is brought into service.
NIM Criterion 16: Safe operation of the infrastructure **Expected evidence** ▪ The aims of the operational arrangements; ▪ An outline of how the organisation delivers those aims, while ensuring safety; ▪ An outline of how key aspects of the SMS are integrated with operational arrangements; ▪ Reference to recognised industry operational standards which have been adopted, and to relevant company standards and procedures.	Section 2 describes LU's arrangements for safe operation of the railway, including LU's Management System, accountability for safety and governance arrangements.

0.3 Revision history of this section

Revision Number	Date	Changes
V2 (as Version 2.00)	October 2011	Five year renewal of LU's Safety Certificate and Safety Authorisation

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Section 1: LU operations and infrastructure

Contents

1.1 Introduction

London Underground (LU) is the metro system which serves London and surrounding counties. This Safety Certificate and Safety Authorisation document describes how LU manages its activities to deliver a safe railway. LU's safety performance has continuously improved over the past 15 years. This document describes some of the changes which have contributed to this improvement. LU's investment programme will further delivery safety and reliability benefits through the delivery of new rolling stock, upgrading of track, new signalling systems and upgraded stations.

This section provides details on the extent of LU's operations, infrastructure and assets. It sets out the extent and dimensions of LU's operations, including:

- a brief history of LU
- a summary of LU lines operated, numbers of stations, trains, track kilometres operated, customer journeys per annum, staff numbers, etc.
- the scope of LU's role in respect of Infrastructure Management and train operation
- overview of the LU asset base.

The above is supported by:

- map showing the extent of LU operations
- map of the LU and Tube Lines maintenance responsibilities
- details of all LU's stations.

1.2 Historical perspective and background

Since the inception in 1863 of the Metropolitan Railway Company, LU's railway operations have grown to cover most of London and parts of Buckinghamshire, Hertfordshire and Essex. The separate railway companies that now form London Underground were brought under a single control when the London Passenger Transport Board was formed in 1933. While significant integration has been delivered across the network, the fundamental characteristics established at the start of the 1900's persist, namely:

- two different sizes of tunnel and train - tube and sub-surface which serve tube stock and surface stock respectively
- severe curvature of the tracks restricting speed
- the severe space constraints of tube stock
- congestion due to the layout of many old stations
- the variety and age of assets used.

These differences are reflected in the different ways that LU's assets have been designed, maintained and operated to control safety risks.

LU became part of Transport for London (TfL) in 2003. TfL is the statutory body responsible for implementing a transport strategy for London, carrying out the Greater London Authority's transport duty and following the directions of the Mayor of London. In 2011, a single Rail and Underground Board was established. This is the Board which

governs London Rail and London Underground (Section 2 describes relevant governance details). The Rail and Underground Managing Director reports directly to the TfL Commissioner.

Three contracts were set up under a Public Private Partnership (PPP) in 2002 and 2003. Under the PPP regime, LU remained a publicly owned operating company, but the engineering maintenance and renewal work was transferred to three infrastructure maintenance and improvement companies. In 2008, ownership of two of the PPP companies (Metronet Rail BCV and Metronet Rail SSL) was transferred to Transport for London. These two bodies still exist as legal entities: LUL Nominee Company SSL and LUL Nominee Company BCV. However, the delivery of the asset management responsibilities have been transferred to LU (via the Asset Performance Directorate or Capital Programmes Directorate). Staff are now either LU or TfL employees.

In 2010, ownership of Tube Lines was transferred to Transport for London. Tube Lines continues to operate as a PPP Supplier and as a completely separate entity to London Underground. However, LU and Tube Lines work very closely together. The Tube Lines Chief Executive Officer is a member of the Rail and Underground Board, reporting to the Rail and Underground Managing Director.

Tube Lines delivers maintenance and project works to London Underground. Tube Lines is also responsible for TransPlant, the engineering train service that supports London Underground. The responsibility for managing TransPlant, including provision of relevant health and safety documentation, was transferred to Tube Lines under the PPP contract. This includes the requirements for a Safety Certificate as required by the Railways and Other Guided Transport Systems (Safety) Regulations. TransPlant holds a Safety Certificate which is valid until 2013. This responsibility continues to sit with Tube Lines. TransPlant operates across the entire LU network.

The employees who provide the services and support outlined in this document consist of LU and TfL employees. In general, LU employees are those who are actively involved in operational, maintenance and project roles while TfL employees are those who provide functional support, e.g. health, safety and environment support, to London Underground. Further details are set out in Section 8.

Maps showing which parts of the LU network LU and Tube Lines are responsible for maintaining are shown in Annex 1B. Additionally, a number of Private Finance Initiatives (PFIs) have been established in relation to specific asset groups. Further detail on the PFI contracts is set out in Sections 12 and 13.

1.3 LU Operations

1.3.1 Overview

LU provides a non-mainline mass transit train and station service seven days a week and is an integral part of the transport system in London. LU carries around 3.5 million customers each weekday and over 1.1 billion customers each year. Over 500 trains enter service each day. The headway between trains during peak hours may be as low as 90 seconds on some lines.

The LU network includes operations over 11 lines as set out below, train operations on Network Rail infrastructure (Queen's Park to Harrow & Wealdstone; Gunnersbury to Richmond) and provision of train service to stations managed by other Infrastructure Managers.

LU operates 11 lines comprising approximately 860 track kilometres linking 270 stations, 262 of which LU operates. The remaining eight stations are operated by Network Rail or other Infrastructure Managers. LU's 11 lines are:

- Bakerloo
- Central
- Circle
- District
- Hammersmith & City
- Jubilee
- Metropolitan
- Northern
- Piccadilly
- Victoria
- Waterloo & City

These lines, the locations they serve and their relationship to each other are shown on the map in Annex 1A.

1.3.2 Infrastructure Manager

LU is the Infrastructure Manager for the LU network. This includes the control of infrastructure and the operation of stations. Details of LU's interfaces and how these are managed to ensure co-operation between the parties are described in Section 12.

As Infrastructure Manager for the LU network, LU has clear accountability for the health and safety of those affected by its operations. Where activities interface with other Transport Undertakings or Infrastructure Managers, LU has established arrangements for co-operation with such bodies which ensure that LU, those affected by its operations and those who affect LU are able to discharge respective obligations and ensure that safety of operation is maintained. Sections 12.6 to 12.11 explain the relevant interfaces and how co-operation is achieved. Section 12.8 describes the operational interfaces with Chiltern Railways (passenger operation between Amersham and Harrow-on-the-Hill stations) and South West Trains (mainly empty stock moves between Wimbledon and East Putney stations).

LU discharges its duties as Infrastructure Manager by ensuring that relevant responsibilities are delivered through the terms and conditions of various contracts and agreements. LU's Management System, risk control systems and workplace precautions are described in this document. These include management controls on the condition of LU infrastructure by:

- setting standards for the design, maintenance and operation of assets
- obtaining assurance that these are complied with
- procuring goods and services through competent suppliers
- gaining assurance about maintenance regimes

- collecting sufficient data to understand the condition of infrastructure
- enforcing requirements through contract management.

Section 13 explains how the design and maintenance of the LU network is managed.

LU ensures co-operation between other members of the LU Group and other Transport Undertakings on the LU network and manages infrastructure operation by:

- setting performance standards within the LU Management System, including the Health, Safety and Environmental Management System (HSEMS) framework
- setting operational standards and procedures
- gaining assurance that standards are complied with and procedures followed
- managing infrastructure availability and access through agreements and contracts
- controlling power supply arrangements.

Health, safety and environment management arrangements are described in Section 2.

1.3.3 Station Operations

LU operates 262 stations. This involves the deployment of premises (used and disused), fixed assets and staff to provide customer access and egress from trains and to generate revenue. LU stations are open to the public from approximately 05.00 until the last train departs which can be any time until approximately 01.30 (traffic hours). Maintenance and improvement work are carried out mainly during hours when stations are not open to the public. Some maintenance and improvement work is carried out during traffic hours. Certain stations, such as Cannon Street, are only open to the public for a lesser period of time.

Station operation requires staff to work in public and non-public areas. The key assets that are operated and managed in public areas include:

- communication equipment
- entrances and exits that may contain ticket halls, means of manual and electronic ticket selling and ticket gates
- fire protection, detection and suppression systems
- lighting and electrical fittings
- Platform Edge Doors (PEDs)
- platforms which may contain vending machines, public address systems and seats
- public area ventilation systems
- stairs, lifts, escalators, subways and moving walkways which provide means of access and egress to and from platforms.

The key assets that are operated and managed in non-public areas include:

- communication equipment
- disused areas*
- interlocking machine rooms

- lift and escalator machine rooms
- relay rooms
- station control rooms
- station computer rooms.

* Disused areas are those areas that were once frequented by customers using the station but have since been partitioned off from general public use. These areas may be utilised for LU equipment such as ventilation shafts or pump rooms.

The standards controlling aspects of station operation are contained in the LU Rule Book.

As Infrastructure Manager (Station Operation), LU is responsible for health and safety at these sites. Several of LU stations interface with other railway operators.

1.3.4 Train Operations

LU operates a fleet of passenger rolling stock. Train operations includes all train movements (whether carrying customers or not) along permanent way over specific routes, usually to a timetable and normally under the control of a Service Controller and the signalling system.

LU operates passenger trains from approximately 05:00 hours until 01:30 hours, over the eleven lines. Trains are provided fit for service by LU's Asset Performance Directorate or Tube Lines and are brought into service by Train Operators from depots or sidings. LU's train crews operate out of line based Train Operations Depots. Staff may also report for duty at remote booking on points.

All LU passenger rolling stock is One Person Operated (OPO). Section 14 contains further detail on rolling stock. The Train Operator operates the train in accordance with signals. Train Operators remain in radio contact with the Service Controller. The standards relating to line control and signalling that control the risks associated with train operations are contained in the LU Rule Book.

The speed of trains across the LU network varies from line to line. The highest speed is 60mph. At certain locations, temporary or permanent speed restrictions may be put in place to manage the train service, e.g. to mitigate the risk of derailment.

At Hammersmith Depot, passenger rolling stock train maintenance is undertaken over the Hammersmith & City line. Approximately 6 shunting moves per day are carried out at this depot which take the train over 10 metres of the operational network. The moves only take place in traffic hours. These moves are required to transfer trains between different parts of the depot for maintenance purposes and there are no customers on the train during this operation. Maximum speed is 5 mph. Waterloo and City line train operations also include shunt movements out of Waterloo Depot onto the running infrastructure.

The Holborn to Aldwych Branch is no longer part of the operational railway, but is retained by London Underground for non-passenger use. The track, signals and infrastructure are all kept in running order. The line is isolated from the main Piccadilly line and is completely self-contained, but a set of points can be commissioned at Holborn to enable the movement of rolling stock on/off the branch. Train protection arrangements remain as they were when the branch operated in customer service.

A train is stabled on the Holborn - Aldwych Branch Line for use in commercial revenue (e.g. filming) activities and engineering tests. This train is a 4 car 1972 Tube Stock, Mark 1 and the Unit is kept in running order. The Unit is on the Asset Register and is maintained periodically as required. The train is only driven by Test Crews from Ruislip Depot. A full record is kept of the use of this train.

LU holds overall responsibility for health and safety aspects of its train operations. LU operates over Network Rail infrastructure on the Bakerloo and District lines. On these sections of track, LU has shared responsibility for safety risk management. For operation over this section, LU complies with the relevant parts of Network Rail's safety arrangements. LU is also committed to complying with any reasonable request Network Rail may make regarding any aspect of activities within the scope of this Safety Certification and Safety Authorisation document.

A link has been added at Barking to Network Rail's Barking to Gospel Oak line, solely for the purpose of moving engineering trains onto the east end of the District line. Network Rail also use a link at Ruislip Depot of stock transfer or delivery purposes. Movements over these links take place in accordance with an operational safety plan or documented plan agreed between LU and Network Rail.

LU also operates a number of specialist engineering vehicles. Where these vehicles need to move in Traffic Hours under their own power, a competent pilot conducts the vehicle to its work site or competent resources will be brought in to operate these miscellaneous vehicles. The vehicles have valid certificates of technical conformance and operating approvals in accordance with LU standards.

LU employs Test Train Operators who undertake a range of activities such as:

- Testing and commissioning of both current and replacement rolling stock
- Stock transfers
- Brake and ancillary equipment testing
- Journey time metric proving
- ATO testing
- Training of LU instructor/operators on new rolling stock
- Rail adhesion activities
- Weed-killing train operation
- Excursion/tour trains
- Gauging activities
- Acting as a pilot for specialist self-propelled on-track engineering vehicles travelling in Traffic Hours where required.

These activities involve, typically, the operation of between 60 and 100 train paths per week. Whilst these activities may be carried out during traffic hours, they do not involve the carriage of customers, apart from excursion/tour trains.

All such operations are carried out under LU's Safety Certificate and in accordance with LU standards for operations safety and competence assurance. The effectiveness of the arrangements is subject to the assurance and approvals regimes described in Sections 13 and 14.

1.3.5 Integrated Control

The organisation and roles and responsibilities that enable safe operation of the LU network as a vertically integrated operation is described in detail in Section 2.2.

1.4 Safety Critical Employees

LU employs approximately 18,000 staff and operates in a hierarchical, functionally based structure. Precise staff numbers for LU and Tube Lines are contained on the LU SAP HRS module. PFI and other suppliers' staff are recorded on their local HR systems. Within LU, a significant proportion of staff undertake safety critical activities as outlined in Table 1.1. Details on managing competence of safety critical employees is set out in Section 8.9.

Safety Critical Activity	Number of Staff (approximate)
Train Operators	3,360
Station Supervisors	1,740
Duty Reliability Managers/Duty Trains Standards Managers/Duty Station Managers	460
Control Room/Signal Cabins staff	600
Checking rail vehicles/fleet	700
Track	630
Structures	225
Signal and communications	675
Pumps and drainage	30
Track safety/protection	30
Test train operation	20
Power supply	70

* Staff who have responsibilities for checking/supervising safety critical activities are also deemed to be safety critical. These staff are included in the relevant function above.

Table 1.1 LU Safety Critical Employees

Tube Lines (including Transplant) and its suppliers employ approximately 3,000 staff. A number of these undertake safety critical activities. Tube Lines maintains safety critical staff as required by law and LU's Category 1 Standard: Safety Critical Work.

The number of contractors employed by LU varies depending on the nature of project and maintenance work and can range from 5,000 to 20,000 (including Tube Lines and its suppliers). This includes contractors employed at LU locations as well as those who work off-site (in or outside London).

1.5 Introduction to LU assets

LU's assets can be categorised as either infrastructure, signalling, train or station assets. The nature of these assets reflects the organic development of the LU network. The design and maintenance of assets are a fundamental control to LU's safety risks.

A number of assets and features of assets are provided specifically to reduce risk arising from human failure or to help control operations in degraded or emergency conditions. A high level description of LU assets is provided in the Sections 1.6 - 1.9.

Not all the features outlined in Sections 1.6 - 1.9 currently apply consistently across the LU network, but they will be applied in accordance with programmes of work or as assets are replaced.

Asset related risks are controlled through design, construction, maintenance and use in accordance with international, European, British, industry and LU standards, including engineering controls to manage residual risks arising from normal and degraded operations.

LU's Asset Management Framework sets out the company's overall approach to asset management. It sets out the links between the LU Strategic Plan, the LU Asset Management Policy & Strategy, Asset Management Objectives and Plans and day to day delivery. LU achieved certification to PAS55, an internationally recognised standard on asset management (published by British Standards Institution), in June 2011. Ongoing assessment and audit is part of the maintenance of this certification.

1.6 Infrastructure assets

1.6.1 Track

The LU network extends over a total of approximately 860 km of running track. The route distance for each line is set out below. LU also has rights to operate over 17 km of Network Rail track. Details are set out in Table 1.2.

Line	Routes	Distance* (km)
Circle line	Hammersmith (via Edgware Road) to Edgware Road	27.00
District line	Ealing Broadway, Richmond, Wimbledon and Kensington (Olympia) to Edgware Road and Upminster	63.90 [Note: Network Rail maintains 3.69 km of the District line.]
Waterloo & City line	Waterloo to Bank	2.37
Hammersmith & City line	Hammersmith to Barking via Liverpool Street	25.44
Metropolitan line	Amersham, Chesham, Watford and Uxbridge to Aldgate (inc. Croxley to Rickmansworth -2.67km)	69.33
Bakerloo line	Harrow & Wealdstone to Elephant & Castle	23.23 [Note: LU is responsible for maintaining 12.42 km of track on

		the Bakerloo line. Network Rail is responsible for maintaining the remaining 10.81km of track.]
Central line	West Ruislip and Ealing Broadway to Epping and Woodford (via Hainault)	73.57
Victoria line	Walthamstow Central to Brixton	21.25
Jubilee line	Stanmore to Stratford (excluding Green Park to Charing Cross - 1.09km)	36.95
Northern line	Edgware, High Barnet and Mill Hill East to Morden via both the Charing Cross and Bank branches	57.70
Piccadilly line	Cockfosters to Uxbridge and Heathrow Terminals 1,2,3, 4 and 5	73.74

* The route distance sets out the distance for each line (e.g. counted separately for District and Circle lines where they share track).

Table 1.2 Length of track on each line

In December 2009, the Circle line was extended and now runs from Edgware Road to Hammersmith, via Edgware Road in order to provide improved services to LU customers. The change was managed via The Plan governance process.

The LU network has single track running for a total length of approximately 17 km at the following locations:

- Aldwych to Holborn (800 m)
- Chalfont & Latimer to Chesham (6.3 km)
- Finchley Central to Mill Hill East (1.1 km)
- Hatton Cross to Heathrow Terminals 1,2,3 via the Heathrow T4 loop (5.5 km)
- Kennington Loop (700 m)
- Kensington (Olympia) to East of Kensington (Olympia) (600 m)
- King's Cross and Euston Loop (1.1 km)

Aldwych and King's Cross and Euston Loop are not considered part of the operational railway.

A number of different track constructions are employed, using wood or concrete sleepers or concrete slabs. In open and sub-surface tunnels, sleepers are laid on stone ballast. In tube tunnels, sleepers are fixed in place by concrete. Where assets are being upgraded, LU's strategy is to replace, where possible, bull headed rail with flat bottomed rail on concrete/modern form sleepers. Track geometry and the track environment, e.g. on a bridge, embankment, etc., influence the track construction.

The LU Category 1 Standard: Track – Performance, design and configuration outlines the issues to be considered during track design, including the normal track loading generated by speed and tonnage of both service vehicles and engineer's vehicles using any particular route. All track is designed and maintained so that track condition, geometry and track bed condition are preserved.

1.6.2 Public Crossing

There is only one public crossing of the track on the LU network. This is situated north of Amersham station. The controls for this crossing consist of:

- reflective white boards positioned 200 metres and 400 metres on the approach side of the crossing in both directions
- warning signs to the public
- non-slip material covering the wooden walking area of the crossing.

1.6.3 Tunnels

Some LU track is housed in tunnels. They are subject to design and maintenance standards to limit the risk of failure. Surface stock is prevented from entering tube tunnels by surface stock detectors where necessary. These turn all signals to danger and raise trainstops. These are located at Finchley Road on the Jubilee line and at Barons Court on the Piccadilly line. Nine pairs of Tube tunnels pass under the River Thames.

Tunnels are fitted with ventilation shafts and fans. These fans may be switched on when necessary and are generally left on. In the usual course of operations the piston effect of trains moving through tunnels provides the majority of ventilation. This is supplemented by tunnel vent shafts on some lines.

Between Westminster station and the Canning Town portal on the Jubilee line, ventilation fans can be used to control smoke and direct air flows in an emergency as part of an integrated tunnel and public area ventilation system.

In each of the two tunnels between the Green Park junction and the Canning Town portal on the Jubilee line, there is a continuous walkway for use by the emergency services.

1.6.4 Pumps and Floodgates

There is one operational floodgate located at Canning Town portal on the Jubilee line that prevents flooding from the River Lea. This floodgate is maintained and operated by Tube Lines on LU's instruction.

There are approximately 2,000 sumps and 800 pumps on the LU network. Pumps, sumps and floodgates control the risk of flooding. These control water levels through the system from underground rivers, broken water mains, sewerage and LU generated waste. Of these, 30 pumps are at critical locations and are monitored and controlled remotely.

1.7 Signalling assets

The prime purpose of the signalling system is to ensure the safe spacing and routing of trains, thereby providing protection against collision and derailment hazards under normal operating conditions. All lines are equipped with protection systems that will

initiate emergency brake applications on trains that pass signals at danger. Calculated overlaps are provided beyond stop signals to provide a safe braking distance for such situations [Note: Compromised overlaps exist as some of the older signalling installations are not protected to the level afforded by current Signalling Standards. Design reviews have been carried out, and where risk assessments recommended remedial signalling works, these have been carried out.] Because of these protection systems, two aspect signals (red and green) are adequate for most running signals. Exceptions to this normal arrangement include three aspect signals (red, amber, green) that are used in some situations where there is speed control, and three and four aspect signals that have been installed where other train operating companies run on LU infrastructure.

The Central, Jubilee and Victoria lines are provided with continuous Automatic Train Protection (ATP) and Automatic Train Operation (ATO). The remaining lines have a train protection system comprising trackside trainstops and train-borne tripcocks. When a signal is at danger and its appropriate trainstop is in the “on” position, the tripcock is mechanically operated which activates the train emergency brake. The Central, Jubilee and Victoria Line systems provide continuous over-speed protection, where maximum safe speed data is transmitted from the trackside to train borne equipment. The Victoria line trains receive track circuit block status and route information by radio from the signalling system and the train-borne automatic train control system calculates the safe speed. The Jubilee Line trains receive similar data about route and train location via a communications loop in-between the running rails. The ATP equipment on Central, Jubilee and Victoria line trains will command an over-speeding train to reduce its speed to below the maximum safe speed.

All other lines with the exception of the Chesham branch of the Metropolitan line (axle counters) are equipped with train detection in the form of jointed or non-jointed (except points and crossing areas) track circuits, with location accuracy supported by delta track circuits or position detectors.

In areas of points and crossings, interlocking systems are employed to ensure that trains are safely routed. These use either mechanical, relay or computer based technology.

At terminal stations with limited over-run distances beyond the platform ends, there are special arrangements for monitoring the speed of trains entering the platforms, whereby emergency brake applications are initiated for over-speeding trains.

The signalling system embodies significant safety redundancy in its design and implementation and not total reliance on safety integrity of a single component. Signalling control systems on the Underground are organised to facilitate control on a line by line basis from line control centres. The basic technology varies from line to line and is outlined below:

- Bakerloo line - Network Rail signal control north of Queen's Park, centralised computer-control system elsewhere,
- Central line - centralised computer-controlled system,
- Circle line – as per Hammersmith & City, Metropolitan and District lines,

- District line - signal cabins east of Aldgate East; Network Rail signal control south of Putney Bridge and on the Richmond branch, centralised control based on programme machines elsewhere,
- Hammersmith & City line - signal cabins at Edgware Road, Whitechapel, Hammersmith and Barking, centralised computer-control system elsewhere
- Jubilee line - centralised computer controlled system,
- Metropolitan line - signal cabins north of Preston Road, centralised computer controlled system elsewhere,
- Northern line - centralised control based on programme machines,
- Piccadilly line - centralised control based on programme machines, east of Turnpike Lane centralised computer-controlled system,
- Victoria line - centralised computer control system,
- Waterloo and City line - centralised computer control at Waterloo.

The use of line control centres means the signalling control is co-ordinated with line control to provide overall safe management of the railway.

Signal control systems are logically separated from vital interlocking so that, under most failure conditions, signal control can be maintained by direct control of site interlocking and, on the newer systems, from local control points.

Signalling controls train movements and maintains spacing between trains. Permanently illuminated red signals are provided at or before buffer stops, train arrestors and other critical locations.

1.8 Rolling stock assets

Details of LU's rolling stock assets are covered in Section 14.

1.9 Station assets

Stations are categorised as open, sub-surface or tube. This categorisation depends on the extent to which the station is underground. Most sub-surface and all Tube stations are fitted with additional fire prevention features and have two independent sources of power.

All stations except for South Kenton, Finsbury Park, Roding Valley, Mill Hill East and Chalfont & Latimer (Northbound) are fitted with Underground Ticketing System gates. These along with lattice gates, the structural design of station premises, fixed and temporary barriers facilitate customer flows.

Each station has individual characteristics that depend on the categorisation, location and whether the station can contain:

- lifts or escalators
- retail units
- a station operations room
- railway infrastructure of another infrastructure manager which is linked to or shares a site with an adjacent station operated by another railway operator.

Stations contain lighting that illuminates all areas of the station premises and emergency lighting that remains on for a designated period when power supplies fail.

LU has a number of disused stations, where a train service is no longer operated. Landlord responsibilities are defined for these stations and regular inspections are undertaken to ensure that these locations posed no risk to the operational railway.

1.10 Maintenance and improvement of assets

The maintenance and improvement of assets is essential to delivering LU's operations and for the control of risks arising from these operations. The importance of the LU asset base has been explained in Sections 1.6-1.9. LU controls the risks associated with assets through the design process operated by competent individuals. The residual risks are controlled through the provision of assets and the correct implementation of their associated use and management arrangements. Further details are available in Section 13.

LU improves assets through its own activities and through contracts with Tube Lines, PFI Suppliers and other suppliers. LU's Asset Performance Directorate, Tube Lines, PFI Suppliers and other suppliers are responsible for maintaining and improving designated packages of assets and ensuring that this is done safely. In LU, the risk control requirements are contained in LU's Management System. The risk control requirements for contracted parties are set out in contractual terms and conditions or LU Category 1 standards. Contractual arrangements are further described in Section 13.

1.11 Power Supply

The following describes the arrangements to supply and distribute power to the LU railway network, including contingency and emergency arrangements.

1.11.1 Power supply responsibilities

UK Power Networks Services (Powerlink) provides power to services throughout the operational railway under a Private Finance Initiative (PFI) service contract. UK Power Networks Services (Powerlink) is hereafter termed the Power PFI contractor. The only exceptions to this are the sections below where Network Rail supplies the power. These are:

- between Waterloo and Bank on the Waterloo and City line and between Putney Bridge and Wimbledon on the District line, where LU is the Infrastructure Manager
- between Acton Lane Junction and Richmond on the District line and between Queens Park and Harrow and Wealdstone on the Bakerloo line where Network Rail is the Infrastructure Manager.

1.11.2 Power supply distribution

Power is derived from the national grid via Bulk Supply Points (BSPs) and a series of high voltage feeders. In addition, gas turbine alternator sets provided by LU's Central Emergency Power Supply (CEPS) are used from time to time to provide power to the

supply distribution system. CEPS is maintained to provide emergency power supplies in the event of a total national power network failure.

The LU distribution network has sufficient redundant capacity to permit failure or disconnection for maintenance of elements of the network without loss of power. The distribution network is owned by LU and is being managed and upgraded by the Power PFI contractor.

Power is distributed through substations and switch-houses. The voltage is transformed and rectified as necessary for the appropriate service as follows:

- 630 V dc for traction (750 V dc for the Victoria line) and, at some locations, for lifts and escalators
- 400/230 V ac for lighting
- 400-600 V ac for signalling
- 400/230 V ac for pumps, lifts, escalators and ancillary services.

1.11.3 Power supply management

The Power PFI contractor has operational management responsibility for the distribution systems outlined below. This is undertaken by their Shift Supply Engineers (SSEs) in the main power control centre. LU has operational control of traction current supplies to the operational railway and to rolling stock depots and low voltage power supplies for signalling, pumps, lighting and lifts and escalators.

The Power PFI contractor is responsible for the supply, distribution of power and the maintenance of all plants and equipments to the point at which the power cable is attached to the outgoing terminal of the substation switchgear. From this point LU, through the Asset Performance Directorate and Tube Lines, is responsible for equipment and cable maintenance. The Power PFI contractor is also responsible for providing the compressed air supply to the LU railway network for the purpose of providing air power to the fixed block signalling system, trainstops and point motors (the only exception to this is on the Jubilee line between Westminster and Stratford).

The boundary between the Power PFI contractor and LU’s or Tube Lines’ asset management responsibilities for the compressed air system is at the outgoing flange of the final isolating valve in the substation.

The respective sections of the power distribution network are managed, controlled and constantly monitored by the Power PFI contractor’s SSEs and LU's Power Control Room Operators (PCROs) using computer-based supervisory control and data acquisition (SCADA) systems. Emergency control facilities are available for use in the event of equipment failure or the need to evacuate the main power control centre.

Where Network Rail supplies power to Network Rail infrastructure, or where LUL infrastructure abuts that of Network Rail, the arrangements for traction power provision are set out in LU-Network Rail infrastructure agreements (which sit with the National Rail Agreements team, Section 12.6).

Technical responsibility for LU power assets sits with the Professional Head of Power Engineering. The day to day control of the circuit breakers is with the LU Power Control

Room. LU works with Network Rail where Network Rail supplies the power to ensure that risks and issues are managed and deal with to ensure appropriate power management across the network.

1.11.4 Traction current control

Traction current is switched on or off by LU's PCROs using SCADA systems in consultation with the appropriate LU Line and Track Access Controllers and in strict compliance with the LU Rule Book. In tunnel and sub-surface areas, traction current can also be switched off in an emergency via the tunnel telephone system. Variations to traction current switching on and off times to allow engineering works are published weekly in the Traffic Circular, Engineering Notices, Nightly Engineering Protection Arrangements (NEPA) and Engineering Works and Safety Arrangements (EWSA). Further detail on these publications is set out in Section 9.4.

The Power PFI contractor has operational responsibilities beyond the maintenance boundaries to ensure that the DC traction current operates in an integrated, safe and efficient manner. These responsibilities are defined in the Power Service Contract.

1.11.5 Standards relating to power supply and distribution

The performance specification within the Power Supply Contract has the mandatory status of a Category 1 LU standard and refers to other Category 1 engineering standards. These standards include requirements for reliability appropriate to the potential safety impacts of power failure.

1.11.6 Operational procedures and practices

Emergency generating equipment is maintained by the Power PFI contractor and is known as the Central Emergency Power Supply (CEPS). CEPS would be used to supply emergency power supplies to stations and other critical areas of the railway in the event of the extensive failure of national grid supplies. This is described further in Section 1.11.9.

1.11.7 Maintenance arrangements

All power distribution equipment is subject to inspections and maintenance by the Power PFI contractor according to relevant legislation, manufacturers' recommendations, accumulated service experience and safety, criticality and duty cycles.

1.11.8 Contingency planning

The Power PFI contractor is required to have effective system contingency plans. These plans detail the actions to be taken in the event of loss of supply from the national grid via the BSPs. They also describe the arrangements to be put in place if asset or equipment failure causes partial or extensive loss of capacity of the 22kV and 11kV distribution network. These plans are reviewed annually or when significant changes to system arrangements are made. The emergency supply arrangements which deal with the provision of emergency supplies, if there is a major disruption to national grid power supplies, are described below.

A specific emergency plan is also maintained by the Network Services Director. This specifies the arrangements and methodology to be adopted in response to a major incident affecting the supply or distribution of electrical supplies.

1.11.9 Emergency supplies

In the unlikely event of a complete failure of the national grid supply to London, central emergency supplies will be provided by CEPS and local supplies by Off Line Battery Inverter (OLBI) or Uninterruptible Power Supply (UPS) units installed in all sub-surface stations. The OLBIs/UPS units will provide immediate restoration of 25% of station lighting and supplies to all services required for evacuation at all sub-surface stations following the failure of supplies from both LU's distribution network and from the Distribution Network Operator (DNO). The OLBIs/UPS units and emergency supplies from CEPS will enable the safe evacuation of customers from stations and trains and the controlled closure of the railway until such time as national grid supplies are restored and stabilised.

1.12 Access

This section explains how access to LU infrastructure, trains and stations is controlled. Controlling access to infrastructure is a component of LU's statutory duty as infrastructure manager and system risk is controlled by managing:

- who can physically get onto the LU network
- when any other organisation can carry out any work on the LU network
- the extent to which the public can gain access to the LU network.

Access arrangements aim to ensure that companies or individuals maintain safety risk to levels that are as low as reasonably practicable (ALARP) when accessing the LU network to carry out their agreed operations. Meeting this objective requires:

- clearly defined responsibilities across organisations for planning access and control of work on the LU network
- assessing the safety risks associated with any work
- restricting access to competent individuals
- preventing trespass.

1.12.1 Access for maintenance and improvement works

Access to LU infrastructure to carry out maintenance and improvement works is controlled via the Access Code. This forms the basis for reserving access to maintain assets, improve assets or provide other services. Access can only be claimed if the requirements of LU standards are met. These standards define how access, once reserved, can be safely claimed. The Access Code and associated LU standards facilitate a controlled system for reserving and claiming access to the LU network. It maintains safety risk associated with access to levels that are ALARP by clearly defining interfaces between the various organisations seeking access and mitigating against competitive pressures. This is achieved through:

- safety being the primary criterion for allowing or denying access
- a contractually mandated and disciplined approach to planning access

- a demonstrably fair division of access between the parties, including a baseline of closures to enable enough engineering work to be completed safely whilst taking into account operational needs
- flexible arrangements for changing those arrangements in real time
- appropriate incentives or compensation or both when access is frustrated accidentally, or by unforeseen events.

Any organisation wishing to access the LU network applies to either LU or Tube Lines. The LU Access Reservation Agency (ARA) operates the access booking system and is responsible for publishing station access requests, following approval by the LU or Tube Lines Access Management teams (depending on the location). The Network Improvements team is responsible for publishing track access requests in the weekly EWSA or daily Engineering Notice updates.

Where activities require access to third party infrastructure, appropriate licences must be held, e.g. Personal Track Safety certificate for Network Rail.

1.12.2 Assessing the safety implications of planned works

The technical implications of any planned works are considered by LU and Tube Lines. The operational safety implications of any planned works are considered through the LU Category 1 HSEMS Standard: Assurance which places responsibilities on landlord managers, e.g. Group Station Managers and Train Operations Managers. These managers or their authorised delegates are the appointed representatives and act as custodians of particular assets. Compliance with this LU standard enables LU to fulfil its duties as infrastructure manager by:

- active dialogue occurring between operational managers, with local knowledge of operations, and suppliers who fully understand the implications of planned works
- landlord managers or their delegates making decisions based on operational risks and the ability to manage the site around the works safely whilst the work is in progress
- Landlord managers or their delegates retaining power of sanction and the right to withdraw access at any time if, in their opinion, operational safety is or may be compromised.

All planned work is subject to the LU assurance process. This requires risks to be identified and mitigation put in place before work commences. Safety assurance is provided by the person planning the work. Those works instigated by Tube Lines are subject to review by LU and approval under defined circumstances.

Details of planned works are published in the Station Works Plan for station access and the Engineering Works and Safety Arrangements and Engineering Notices for work on the track. These documents are widely circulated to all who are affected or are likely to be affected by the works.

Once access has been approved and work commences, regular checks of the work are conducted by the person accountable for planning the work via planned Interim Works Inspections. In addition, checks are carried out by LU operating staff during routine checks of the station in order to ensure that the safety of LU staff and customers is not

compromised. On completion of the work, the accountable manager signs off work as being completed to the required standard in line with the relevant LU process.

The following table provides a summary of access related activity and the respective responsibilities under the LU access control arrangements.

Access Activity	Responsible Organisation
Infrastructure Manager role	LU
Principal contractor role (Engineering Hours)	LU, Tube Lines or other third party
Maintain database of licensed Protection Masters and issue licences	LU
Forward planning of access	LU, Tube Lines or other third party
Maintain access reservation system	LU
Process and confirm access requests	LU or Tube Lines
Assess the effect on the network of proposed works, including closures	LU
Check and co-ordinate all proposed works to comply with CDM regulations and assure engineering work safely	LU or Tube Lines
Assess impacts on LU operations	LU or Tube Lines for engineering impacts, LU for operational impacts
Request 'on the night' track or station access	LU, Tube Lines or other third party
Grant planned and real-time authority for access to track or stations	LU
Switch traction current on/off	LU
Provide formal assurance 'on the night' that the site is clear	LU, Tube Lines or other third party
Determine 'on the night' that line is clear after works, and pass works back for operational use	LU

Table 1.3 Access activities and LU access control activities

Specific access procedures and controls, including for planned and unplanned works, have been established in respect of:

- stations
- track (engineering and traffic hours)
- possessions
- depots and sidings.

1.12.3 Restricting access to competent individuals

Access to the LU network is restricted to individuals carrying staff passes or LUCAS cards. LUCAS (London Underground Combined Access System) is the membership and Smartcard scheme for engineering and construction workers on LU. It ensures that anyone working on LU infrastructure has the necessary understanding on all access, health, safety and environmental issues affecting the Underground. Access arrangements are applied through the LU Rule Book which requires employees or suppliers carrying out safety critical work to carry the appropriate permits.

Access to train cabs is restricted to authorised personnel in accordance with the LU Rule Book.

Access to potentially hazardous environments, such as equipment rooms or machine chambers, is restricted to individuals who have the relevant licence or permit.

1.12.4 Prevention of public access to non-public areas

If an individual who is not a member of staff wishes to access parts of the LU network from which they would usually be prohibited, either a public area that is closed for Engineering Hours or a non-public area, they require a LUCAS card in accordance with the relevant LU Rule Book concerning access. If a member of the public wishes to access parts of the LU network from which they would usually be prohibited, they must sign in as a visitor and be accompanied by a member of staff.

In order to deter and prevent trespassers gaining access, LU staff follow the arrangements contained in the LU Rule Book for the opening and closing of stations and for station security. LU also has a number of security devices including locked doors, padlocks, coded door access systems, razor wire on fencing and CCTV fitted across the LU network.

Trespass is also managed by use of the powers to convict, under the provisions of the British Transport Commission Act.

1.13 Revision history of this section

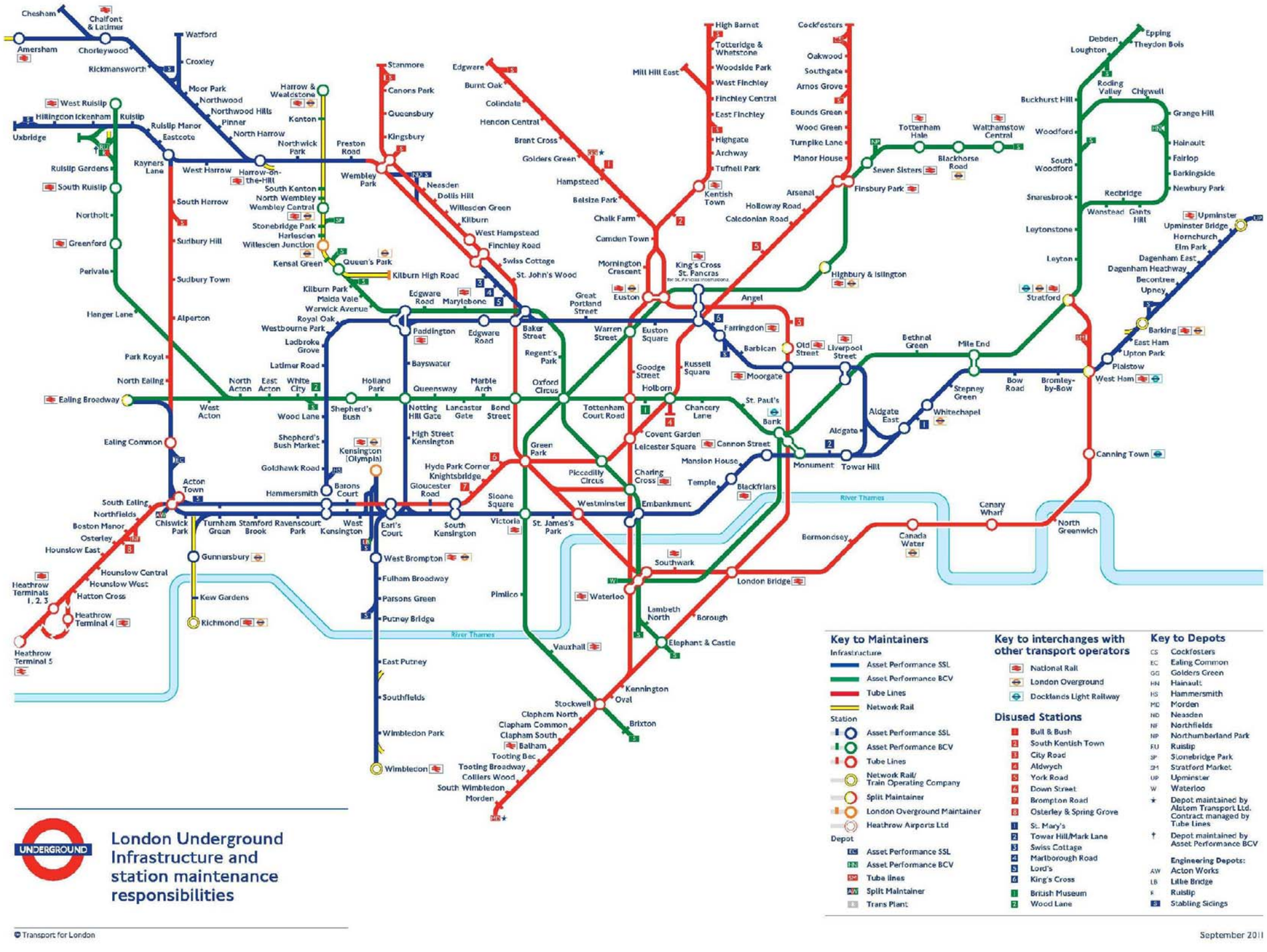
Revision Number	Date	Changes
V2 (as Version 2.00)	October 2011	Five year renewal of LU's Safety Certificate and Safety Authorisation

Annex 1A: LU operations map

The map below shows the extent of LU operations.

Annex 1B: Infrastructure maintenance responsibilities

The map below shows the infrastructure and station maintenance responsibilities.



Annex 1C: Stations operated or served by LU

Table 1: LU operated stations

Station	Maintainer	Sub-surface Station	No. of Lifts	No. of Escalators	Step Free Access	Number of LU platforms	Train Services
Acton Town	Tube Lines	No	2	Nil	Yes	4	District Piccadilly
Aldgate	LU	Yes	Nil	Nil	No	4	Circle Metropolitan
Aldgate East	LU	Yes	Nil	Nil	No	2	District H & C
Alperton	Tube Lines	No	Nil	Nil	No	2	Piccadilly
Amersham	LU	No	Nil	Nil	Yes (southbound only)	3	Metropolitan Chiltern
Angel	Tube Lines	Yes	Nil	6	No	2	Northern
Archway	Tube Lines	Yes	Nil	2	No	2	Northern
Arnos Grove	Tube Lines	No	Nil	Nil	No	4	Piccadilly
Arsenal	Tube Lines	Yes	Nil	Nil	No	2	Piccadilly
Baker Street	LU	Yes	Nil	6	No	10	Metropolitan Circle H & C Jubilee Bakerloo
Balham	Tube Lines	Yes	Nil	2	No	2	Northern
Bank/ Monument	LU	Yes	6	15 [Note: there are also 2 moving walkways at Bank]	No	8 (DLR also has 2 platforms at Bank station)	Circle District Northern Central Waterloo & City DLR
Barbican	LU	No	Nil	Nil	No	3	Circle H & C Metropolitan
Barkingside	LU	No	Nil	Nil	Yes (eastbound only)	2	Central

Station	Maintainer	Sub-surface Station	No. of Lifts	No. of Escalators	Step Free Access	Number of LU platforms	Train Services
Barons Court	LU	No	Nil	Nil	No	4	District Piccadilly
Bayswater	LU	Yes	Nil	Nil	No	2	District Circle
Becontree	LU	No	Nil	Nil	No	2	District
Belsize Park	Tube Lines	Yes	3	Nil	No	2	Northern
Bermondsey	Tube Lines	Yes	1	3	Yes	2	Jubilee
Bethnal Green	LU	Yes	Nil	3	No	2	Central
Blackfriars (station closed from March 2009 to December 2011)	LU	Yes	Nil	Nil	No	2	Circle District
Blackhorse Road*	LU	Yes	Nil	2	No	4	Victoria London Overground
Bond Street	LU	Yes	Nil	8	No	4	Central Jubilee
Borough	Tube Lines	Yes	2	Nil	No	2	Northern
Boston Manor	Tube Lines	No	Nil	Nil	No	2	Piccadilly
Bounds Green	Tube Lines	Yes	Nil	2	No	2	Piccadilly
Bow Road	LU	Yes	Nil	Nil	No	2	District H & C
Brent Cross	Tube Lines	No	Nil	Nil	No	2	Northern
Brixton	LU	Yes	2	3	Yes	2	Victoria
Bromley-by-Bow	LU	No	Nil	Nil	No	2	District H & C
Buckhurst Hill	LU	No	Nil	Nil	No	2	Central
Burnt Oak	Tube Lines	No	Nil	Nil	No	2	Northern
Caledonian Road	Tube Lines	Yes	2	Nil	Yes	2	Piccadilly
Camden Town	Tube Lines	Yes	Nil	2	No	4	Northern
Canada Water	Tube Lines	Yes	3 [Note: Also 1 lift for use of Fire Brigade only.]	8	No	4	Jubilee London Overground

Station	Maintainer	Sub-surface Station	No. of Lifts	No. of Escalators	Step Free Access	Number of LU platforms	Train Services
Canary Wharf	Tube Lines	Yes	2 [Note: Also 1 lift for use of Fire Brigade only.]	20	Yes	2	Jubilee
Canning Town	Tube Lines	No	3	10	Yes	2	DLR Jubilee
Cannon Street	LU	Yes	Nil	Nil	No	2	Circle District
Canons Park	Tube Lines	No	Nil	Nil	No	2	Jubilee
Chalfont & Latimer	LU	No	Nil	Nil	Yes	3	Metropolitan Chiltern
Chalk Farm	Tube Lines	Yes	2	Nil	No	2	Northern
Chancery Lane	LU	Yes	Nil	5	No	2	Central
Charing Cross	LU	Yes	Nil	10 [Note: 4 escalators to Jubilee line.]	No	6	Bakerloo Jubilee (emergency and special workings) Northern
Chesham	LU	No	Nil	Nil	Yes	1	Metropolitan
Chigwell	LU	No	Nil	Nil	No	2	Central
Chiswick Park	LU	No	Nil	Nil	No	2	District
Chorleywood	LU	No	Nil	Nil	Yes	2	Metropolitan Chiltern
Clapham Common	Tube Lines	Yes	Nil	2	No	2	Northern
Clapham North	Tube Lines	Yes	Nil	2	No	2	Northern
Clapham South	Tube Lines	Yes	Nil	2	No	2	Northern
Cockfosters	Tube Lines	No	Nil	Nil	No	4	Piccadilly
Colindale	Tube Lines	No	Nil	Nil	No	2	Northern
Colliers Wood	Tube Lines	Yes	Nil	2	No	2	Northern
Covent Garden	Tube Lines	Yes	4	Nil	No	2	Piccadilly
Croxley	LU	No	Nil	Nil	No	2	Metropolitan
Dagenham East	LU	No	Nil	Nil	No	2	District

Station	Maintainer	Sub-surface Station	No. of Lifts	No. of Escalators	Step Free Access	Number of LU platforms	Train Services
Dagenham Heathway	LU	No	Nil	Nil	Yes	2	District
Debden	LU	No	Nil	Nil	Yes (E/B only)	2	Central
Dollis Hill	Tube Lines	No	Nil	Nil	No	2	Jubilee
Ealing Broadway	LU	No	Nil	Nil	No	5	Central District
Ealing Common	Tube Lines	No	Nil	Nil	No	2	District Piccadilly
Earl's Court	LU	Yes	4	4	Yes	6	District Piccadilly
Eastcote	LU	No	Nil	Nil	No	2	Metropolitan Piccadilly
East Acton	LU	No	Nil	Nil	No	2	Central
East Finchley	Tube Lines	No	Nil	Nil	No	4	Northern
East Ham	LU	No	2	Nil	Yes	3	District H & C
East Putney	LU	No	Nil	Nil	No	2	District SWT non-stopping
Edgware	Tube Lines	No	2	Nil	Yes	3	Northern
Edgware Road	LU	No	Nil	Nil	No	4	Circle H & C District
Edgware Road	LU	Yes	2	Nil	No	2	Bakerloo
Elephant & Castle	LU	Yes	5	Nil	Yes [Note: The only step free access is the S/B Northern Line]	4	Northern Bakerloo
Elm Park	LU	No	Nil	Nil	Yes	2	District
Embankment	LU	Yes	Nil	10	No	6	Circle District Northern Bakerloo
Epping	LU	No	Nil	Nil	Yes (only	2	Central

Station	Maintainer	Sub-surface Station	No. of Lifts	No. of Escalators	Step Free Access	Number of LU platforms	Train Services
					platform 2)		
Euston	Tube Lines	Yes	Nil	8	No	6	Northern Victoria
Euston Square	LU	Yes	Nil	Nil	No	2	Circle Metropolitan H & C
Fairlop	LU	No	Nil	Nil	No	2	Central
Farringdon	LU	No	Nil	Nil	No	4	Circle Metropolitan H & C
Finchley Central	Tube Lines	No	2	Nil	Yes	3	Northern
Finchley Road	Tube Lines	No	Nil	Nil	No	4	Metropolitan Jubilee
Finsbury Park	Tube Lines	Yes	Nil	Nil	No	4	Piccadilly Victoria
Fulham Broadway	LU	Yes	2	Nil	Yes	2	District
Gants Hill	LU	Yes	Nil	3	No	2	Central
Gloucester Road	LU	Yes	2	Nil	No	5	District Circle Piccadilly
Golders Green	Tube Lines	No	2	Nil	Yes	4	Northern
Goldhawk Road	LU	No	Nil	Nil	No	2	H & C
Goodge Street	Tube Lines	Yes	4	Nil	No	2	Northern
Grange Hill	LU	No	Nil	Nil	No	2	Central
Great Portland Street	LU	Yes	Nil	Nil	No	2	Circle Metropolitan H & C
Green Park	Tube Lines	Yes	6	11	Yes	6	Piccadilly Victoria Jubilee
Greenford	LU	No	Nil	1	No	2	First Great Western
Gunnersbury*	LU	No	Nil	Nil	No	2	District London Overground
Hainault	LU	No	3	Nil	Yes	3	Central

Station	Maintainer	Sub-surface Station	No. of Lifts	No. of Escalators	Step Free Access	Number of LU platforms	Train Services
Hammersmith (District)	LU	No	2	Nil	Yes	4	District Piccadilly
Hammersmith (Hamm & City)	LU	No	Nil	Nil	Yes	3	H & C
Hampstead	Tube Lines	Yes	4	Nil	No	2	Northern
Hanger Lane	LU	No	Nil	Nil	No	2	Central
Harlesden*	LU	No	Nil	Nil	No	2	Bakerloo London Overground
Harrow and Wealdstone*	LU	No	4	Nil	Yes	2	Bakerloo London Overground London Midland Southern
Harrow-on-the-Hill	LU	No	Nil	Nil	No	6	Metropolitan Chiltern
Hatton Cross	Tube Lines	Yes	Nil	Nil	No	2	Piccadilly
Heathrow Terminal 4	Tube Lines	Yes	Nil	Nil	Yes	1	Piccadilly
Heathrow Terminals 1 2 3	Tube Lines	Yes	1	6	Yes	2	Piccadilly
Hendon Central	Tube Lines	No	1	Nil	Yes	2	Northern
High Barnet	Tube Lines	No	Nil	Nil	Yes	3	Northern
High Street Kensington	LU	No	Nil	Nil	No	4	Circle District
Highbury and Islington*	LU	Yes	3	2	No	6	Victoria First Capital Connect London Overground
Highgate	Tube Lines	Yes	Nil	3	No	2	Northern
Hillingdon	LU	No	2	Nil	Yes	2	Metropolitan Piccadilly
Holborn	LU	Yes	Nil	7	No	4	Central Piccadilly
Holland Park	LU	Yes	2	Nil	No	2	Central

Station	Maintainer	Sub-surface Station	No. of Lifts	No. of Escalators	Step Free Access	Number of LU platforms	Train Services
Holloway Road	Tube Lines	Yes	2	Nil	No	2	Piccadilly
Hornchurch	LU	No	Nil	Nil	No	2	District
Hounslow Central	Tube Lines	No	Nil	Nil	No	2	Piccadilly
Hounslow East	Tube Lines	No	2	Nil	Yes	2	Piccadilly
Hounslow West	Tube Lines	Yes	1 [Note: Lift is for wheelchair access only.]	Nil	Yes [Note: For wheelchair access only.]	2	Piccadilly
Hyde Park Corner	Tube Lines	Yes	Nil	2	No	2	Piccadilly
Ickenham	LU	No	Nil	Nil	No	2	Metropolitan Piccadilly
Kennington	Tube Lines	Yes	2	Nil	No	4	Northern
Kensal Green	LU	No	Nil	Nil	No	2	Bakerloo London Overground
Kentish Town	Tube Lines	Yes	Nil	2	No	2	Northern
Kenton*	LU	No	Nil	Nil	No	2	Bakerloo London Overground
Kew Gardens*	LU	No	Nil	Nil	No	2	District London Overground
Kilburn	Tube Lines	No	1	Nil	No	2	Jubilee
Kilburn Park	LU	Yes	Nil	2	No	2	Bakerloo
King's Cross St Pancras	LU	Yes	10	18	Yes	8	Circle Metropolitan Northern H & C Victoria Piccadilly First Capital Connect Eurostar East Coast Trains

Station	Maintainer	Sub-surface Station	No. of Lifts	No. of Escalators	Step Free Access	Number of LU platforms	Train Services
Kingsbury	Tube Lines	No	2	Nil	Yes	2	Jubilee
Knightsbridge	Tube Lines	Yes	Nil	5	No	2	Piccadilly
Ladbroke Grove	LU	No	Nil	Nil	No	2	H & C
Lambeth North	LU	Yes	2	Nil	No	2	Bakerloo
Lancaster Gate	LU	Yes	2	Nil	No	2	Central
Latimer Road	LU	No	Nil	Nil	No	2	H & C
Leicester Square	Tube Lines	Yes	Nil	6	No	4	Piccadilly Northern
Leyton	LU	No	Nil	Nil	No	2	Central
Leytonstone	LU	No	Nil	Nil	No	3	Central
Liverpool Street	LU	Yes	Nil	9	Yes (Eastbound Circle, Hamm & City and Metropolitan lines)	4	Circle Metropolitan H & C Central
London Bridge	Tube Lines	Yes	3	17	Yes	4	Northern Jubilee
Loughton	LU	No	Nil	Nil	No	4	Central
Maida Vale	LU	Yes	Nil	2	No	2	Bakerloo
Manor House	Tube Lines	Yes	Nil	3	No	2	Piccadilly
Mansion House	LU	Yes	Nil	Nil	No	3	Circle District
Marble Arch	LU	Yes	Nil	2	No	2	Central
Marylebone	LU	Yes	Nil	2	No	2	Bakerloo
Mile End	LU	Yes	Nil	Nil	No	4	Central District H & C
Mill Hill East	Tube Lines	No	Nil	Nil	No	1	Northern
Moor Park	LU	No	Nil	Nil	No	4	Metropolitan Chiltern
Moorgate	LU	Yes	Nil	6	No	6	Circle Metropolitan H & C Northern First Capital Connect

Station	Maintainer	Sub-surface Station	No. of Lifts	No. of Escalators	Step Free Access	Number of LU platforms	Train Services
Morden	Tube Lines	No	2	Nil	Yes	4	Northern
Mornington Crescent	Tube Lines	Yes	2	Nil	No	2	Northern
Neasden	Tube Lines	No	Nil	Nil	No	4	Metropolitan (usually non-stopping) Jubilee
Newbury Park	LU	No	Nil	Nil	No	2	Central
Northfields	Tube Lines	No	Nil	Nil	No	4	Piccadilly
Northolt	LU	No	Nil	Nil	No	2	Central
Northwick Park	LU	No	Nil	Nil	No	2	Metropolitan
Northwood	LU	No	Nil	Nil	No	2	Metropolitan
Northwood Hills	LU	No	Nil	Nil	No	2	Metropolitan
North Acton	LU	No	Nil	Nil	No	3	Central
North Ealing	Tube Lines	No	Nil	Nil	No	2	Piccadilly
North Greenwich	Tube Lines	Yes	4 [Note: There is also an additional stair lift]	9	No	3	Jubilee
North Harrow	LU	No	Nil	Nil	No	2	Metropolitan
North Wembley*	LU	No	Nil	Nil	No	2	Bakerloo London Overground
Notting Hill Gate	LU	Yes	Nil	6	No	4	Circle District Central
Oakwood	Tube Lines	No	1	Nil	Yes	2	Piccadilly
Old Street	Tube Lines	Yes	Nil	3	No	2	Northern First Capital Connect
Osterley	Tube Lines	No	Nil	Nil	No	2	Piccadilly
Oval	Tube Lines	Yes	Nil	2	No	2	Northern
Oxford Circus	LU	Yes	Nil	14	No	6	Central Victoria Bakerloo

Station	Maintainer	Sub-surface Station	No. of Lifts	No. of Escalators	Step Free Access	Number of LU platforms	Train Services
Paddington (Praed Street)	LU	Yes	Nil	4	No	4	Circle District Bakerloo
Paddington (suburban)	LU	No	Nil	Nil	No	6	H & C
Park Royal	Tube Lines	No	Nil	Nil	No	2	Piccadilly
Parsons Green	LU	No	Nil	Nil	No	2	District
Perivale	LU	No	Nil	Nil	No	2	Central
Piccadilly Circus	LU	Yes	Nil	11	No	4	Bakerloo Piccadilly
Pimlico	LU	Yes	Nil	2	No	2	Victoria
Pinner	LU	No	2	Nil	Yes	2	Metropolitan
Plaistow	LU	No	Nil	Nil	No	3	District H & C
Preston Road	LU	No	Nil	Nil	No	2	Metropolitan
Putney Bridge	LU	No	Nil	Nil	No	3	District
Queen's Park*	LU	No	Nil	Nil	No	2	Bakerloo London Overground
Queensbury	Tube Lines	No	Nil	Nil	No	2	Jubilee
Queensway	LU	Yes	2	Nil	No	2	Central
Ravenscourt Park	LU	No	Nil	Nil	No	2	District Piccadilly non-stopping
Rayners Lane	LU	No	Nil	Nil	No	2	Metropolitan Piccadilly
Redbridge	LU	Yes	Nil	Nil	No	2	Central
Regent's Park	LU	Yes	2	Nil	No	2	Bakerloo
Rickmansworth	LU	No	Nil	Nil	Yes (S/B only)	2	Metropolitan Chiltern
Roding Valley	LU	No	Nil	Nil	Yes	2	Central
Royal Oak	LU	No	Nil	Nil	No	2	H & C
Ruislip	LU	No	Nil	Nil	No	2	Metropolitan Piccadilly
Ruislip Gardens	LU	No	Nil	Nil	No	2	Central
Ruislip Manor	LU	No	Nil	Nil	No	2	Metropolitan Piccadilly
Russell Square	Tube Lines	Yes	3	Nil	No	2	Piccadilly

Station	Maintainer	Sub-surface Station	No. of Lifts	No. of Escalators	Step Free Access	Number of LU platforms	Train Services
Seven Sisters	LU	Yes	Nil	2	No	2	National Express East Anglia Victoria
Shepherd's Bush Market	LU	No	Nil	Nil	No	2	H & C
Shepherd's Bush	LU	Yes	Nil	2	No	2	Central
Sloane Square	LU	No	Nil	2	No	2	Circle District
Snaresbrook	LU	No	Nil	Nil	No	2	Central
Southfields	LU	No	Nil	Nil	No	2	District South West Trains (non-stopping)
Southgate	Tube Lines	Yes	Nil	2	No	2	Piccadilly
Southwark	Tube Lines	Yes	2	8	Yes	2	Jubilee
South Ealing	Tube Lines	No	Nil	Nil	No	4	Piccadilly
South Harrow	Tube Lines	No	Nil	Nil	No	2	Piccadilly
South Kensington	LU	Yes	Nil	5	No	4	Circle District Piccadilly
South Kenton*	LU	No	Nil	Nil	No	2	Bakerloo London Overground
South Ruislip	LU	No	Nil	Nil	No	2	Central
South Wimbledon	Tube Lines	Yes	Nil	2	No	2	Northern
South Woodford	LU	No	Nil	Nil	Yes [Eastbound am peak only]	2	Central
St. James's Park	LU	Yes	Nil	Nil	No	2	Circle District
St. John's Wood	Tube Lines	Yes	Nil	2	No	2	Jubilee
St. Paul's	LU	Yes	Nil	4	No	2	Central
Stamford Brook	LU	No	Nil	Nil	No	2	Piccadilly non-stopping District
Stanmore	Tube Lines	No	Nil	Nil	Yes	2	Jubilee

Station	Maintainer	Sub-surface Station	No. of Lifts	No. of Escalators	Step Free Access	Number of LU platforms	Train Services
Stepney Green	LU	Yes	Nil	Nil	No	2	District H & C
Stockwell	Tube Lines	Yes	Nil	3	No	4	Victoria Northern
Stonebridge Park*	LU	No	Nil	Nil	No	2	Bakerloo London Overground
Stratford	Tube Lines	No	5 (+ 1 lifting platform)	2	Yes	5	Central Jubilee DLR London Overground c2c Southern (high speed domestic services) National Express East Anglia Eurostar
Sudbury Hill	Tube Lines	No	Nil	Nil	Yes	2	Piccadilly
Sudbury Town	Tube Lines	No	Nil	Nil	Yes	2	Piccadilly
Swiss Cottage	Tube Lines	Yes	Nil	2	No	2	Jubilee
Temple	LU	Yes	Nil	Nil	No	2	Circle District
Theydon Bois	LU	No	Nil	Nil	Yes (eastbound only)	2	Central
Tooting Bec	Tube Lines	Yes	Nil	2	No	2	Northern
Tooting Broadway	Tube Lines	Yes	Nil	3	No	2	Northern
Tottenham Court Road	Tube Lines	Yes	Nil	6	No	4	Central Northern
Tottenham Hale	LU	Yes	1	2	Yes	2	Victoria National Express East Anglia
Totteridge & Whetstone	Tube Lines	No	Nil	Nil	No	2	Northern

Station	Maintainer	Sub-surface Station	No. of Lifts	No. of Escalators	Step Free Access	Number of LU platforms	Train Services
Tower Hill	LU	Yes	Nil	Nil	No	3	Circle District
Tufnell Park	Tube Lines	Yes	2	Nil	No	2	Northern
Turnham Green	LU	No	Nil	Nil	No	4	District Piccadilly (non-stopping except early and late)
Turnpike Lane	Tube Lines	Yes	Nil	3	No	2	Piccadilly
Upminster Bridge	LU	No	Nil	Nil	No	2	District
Upney	LU	No	Nil	Nil	Yes	2	District
Upton Park	LU	No	Nil	Nil	No	2	District H & C
Uxbridge	LU	No	Nil	Nil	Yes	4	Metropolitan Piccadilly
Vauxhall	LU	Yes	Nil	2	No	2	Victoria
Victoria	LU	Yes	Nil	6	No	4	Circle District Victoria
Walthamstow Central	LU	Yes	2	2	No	2	Victoria
Wanstead	LU	Yes	Nil	2	No	2	Central
Warren Street	LU	Yes	Nil	7	No	4	Northern Victoria
Warwick Avenue	LU	Yes	Nil	2	No	2	Bakerloo
Waterloo	Tube Lines	Yes	2 [Note: Also one lift for use of Fire Brigade only.]	23 and 2 moving walkways	Yes (only Jubilee and W&C)	8	Northern Bakerloo Jubilee Waterloo & City
Watford	LU	No	Nil	Nil	No	2	Metropolitan
Wembley Central*	LU	Yes	Nil	Nil	No	2	Bakerloo London Overground London Midland Southern
Wembley Park	Tube	No	5	Nil	Yes	6	Metropolitan

Station	Maintainer	Sub-surface Station	No. of Lifts	No. of Escalators	Step Free Access	Number of LU platforms	Train Services
	Lines						Jubilee
West Acton	LU	No	Nil	Nil	No	2	Central
West Brompton*	LU	No	2	Nil	One platform only	2	District London Overground Southern
West Finchley	Tube Lines	No	Nil	Nil	Yes	2	Northern
West Ham	Tube Lines	No	2	6	Yes [no step free access to DLR]	8	District H & C DLR Jubilee C2C Rail
West Hampstead	Tube Lines	No	Nil	Nil	No	2	Jubilee
West Harrow	LU	No	Nil	Nil	No	2	Metropolitan
West Kensington	LU	No	Nil	Nil	No	2	District
West Ruislip	LU	No	Nil	Nil	No	2	Central
Westbourne Park	LU	No	Nil	Nil	No	2	H & C
Westminster	Tube Lines	Yes	5	17	Yes	4	Circle District Jubilee
White City	LU	No	Nil	Nil	No	4	Central
Whitechapel	LU	No	Nil	Nil	No	4	H & C District London Overground
Willesden Green	Tube Lines	No	Nil	Nil	No	4	Metropolitan Jubilee
Wimbledon Park	LU	No	Nil	Nil	No	2	District, South West Trains (trains non-stopping), South West Trains (stopping prior to going into Wimbledon Park Train Care Depot).

Station	Maintainer	Sub-surface Station	No. of Lifts	No. of Escalators	Step Free Access	Number of LU platforms	Train Services
Woodford	LU	No	Nil	Nil	Yes (W/B only)	3	Central
Wood Green	Tube Lines	Yes	Nil	3	No	2	Piccadilly
Wood Lane	LU	No	4	Nil	Yes	2	H & C
Woodside Park	Tube Lines	No	Nil	Nil	Yes	2	Northern

Notes:

* LU is the Infrastructure Manager for all stations in Table 1 above, apart from those indicated with an asterisk. LU is the Station Facility Owner at the14 asterisked stations in a regulated agreement with Network Rail. Network Rail is the Infrastructure Manager for these stations. LU's responsibilities as Station Facility Owner involves operation and light maintenance at the following stations: Harrow & Wealdstone, Kenton, South Kenton, North Wembley, Wembley Central, Stonebridge Park, Harlesden, Kensal Green, Queens Park, Kew Gardens, Gunnersbury and the parts of the station served by LOROL at Highbury & Islington, Blackhorse Road and West Brompton. At these last 3 stations, LUL owns or has long term lease for the remainder of the station.

** "Sub-surface stations" are those to which certain fire precautions apply (often referred to as the Section 12 Regulations as they were introduced under section 12 of the Fire Precautions Act 1971). The fire precaution requirements are set out in the Fire Precautions (Sub-surface Railway Stations) Regulations 2009.

Table 2: Stations operated by other operators served by LU trains services

Station	Station operator	Station services delivery group
Barking	c2c	LU
Heathrow Terminal 5	Heathrow Express	Tube Lines
Kensington (Olympia)	LOROL	LU
Kilburn High Road	LOROL	LU
Richmond	South West Trains	LU
Upminster	c2c	LU
Willesden Junction	LOROL	LU
Wimbledon	South West Trains	LU

Table 3: LU disused stations

The table below lists LU disused stations, those stations where LU no longer operates a train service.

Line	Station	Location
Central	British Museum	Between Holborn and Chancery Lane
Central	Wood Lane	Between Shepherd's Bush and White City
District	Mark Lane	West of Tower Hill Station
District	St. Marys	Between Aldgate East and Whitechapel
Metropolitan	Lords	Between Baker Street and Finchley Road
Metropolitan	Marlborough Road	Between Baker Street and Finchley Road
Metropolitan	Swiss Cottage	Between Baker Street and Finchley Road
Northern	Angel (old station)	Adjacent to existing station
Northern	Bull and Bush	Between Hampstead and Belsize Park
Northern	City Road	Between Angel and Old Street
Northern	Euston	Adjacent to existing station
Northern	Highgate	Adjacent to existing station
Northern	South Kentish Town	Between Kentish Town and Camden Town
Piccadilly	Aldwych	South of Holborn
Piccadilly	Brompton Road	Between Knightsbridge and South Kensington
Piccadilly	Down Street	Between Green Park and Hyde Park Corner
Piccadilly	Osterley & Spring Grove	Between Osterley and Boston Manor
Piccadilly	York Road	Between King's Cross and Caledonian Road

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Section 2: Health, safety and environment management arrangements

Contents

2.1 Introduction

London Underground introduced its first formal safety management system in 1988. Since then, LU has continued to review and develop the system, to incorporate health and environment (LU's Health, Safety and Environment Management System - HSEMS) and integrate it with operational and engineering standards. This has now been developed into a Management System which covers all aspects of LU's activities (described in Section 2.4).

LU's management arrangements, as described below, are the top level of management control. They dictate how the organisation organises, plans, controls and monitors the design and implementation of risk control systems. These arrangements allow delivery of legal responsibilities, including responsibilities as infrastructure manager. They also take account of and impose requirements on other members of the LU Group.

The LU management control system comprises of a number of systems that collectively manage business risks. This system encompasses the policies, standards, processes and behaviours that taken together:

- facilitate effective and efficient operation by enabling appropriate response to significant risks to achieving business objectives
- generate a flow of timely, relevant and reliable information within LU, within the LU Group and to outside parties
- ensure compliance with applicable legislation, the Management System (including company policies and standards) and Railway Group Standards.

The LU Health, Safety and Environment (HSE) arrangements described in this section cover train operator and infrastructure manager (including station operator) roles. Safe operation is achieved by the effective implementation of the HSE arrangements described. The following sections, which relate to LU's integrated safety management system approach to all activities, cover:

- Organisation structure
- HSE governance arrangements
- The LU Management System including policies, standards and how compliance is managed
- The structure and key elements of HSE arrangements
- Health and Safety consultation process
- HSE performance monitoring.

This section also describes two important additional aspects of the infrastructure management role:

- management and control of power supply arrangements
- management, control and access to infrastructure.

The LU arrangements for HSE management are fully integrated with other management activities. This is described in Section 6 which deals with business planning, target setting and safety improvement.

2.2 Organisation and Governance

2.2.1 LU Organisation

London Underground is part of Transport for London (TfL), the authority responsible for delivering transport operations in London.

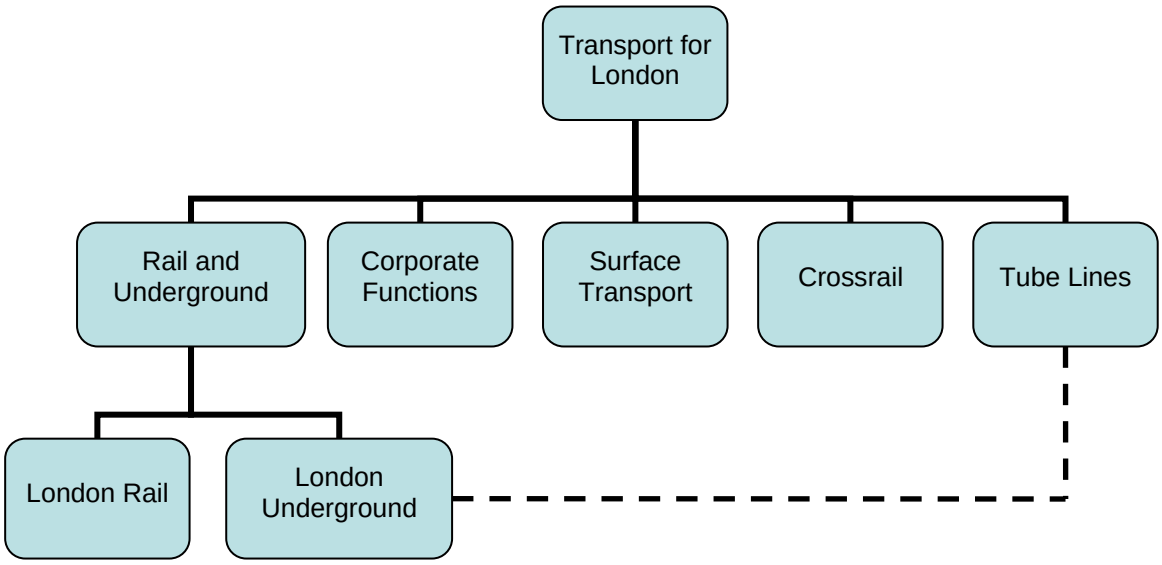

Figure 2.1 Transport for London organisation structure

In 2011, a single Rail and Underground Board (RUB) ('The Board') was established. The Board governs London Rail and London Underground and is accountable for making strategic decisions which govern London Underground (LU) and London Rail (LR) and for managing risks significant to LU's business objectives. These include health and safety risks. While some overlaps in safety management exist between London Underground and London Rail, e.g. a common HSE policy, LU and LR have different and clearly separate operating models and management arrangements. The London Underground Management System (which includes LU's arrangements for HSE management) is clearly distinct and defined. This is set out in the remainder of this section.

In 2010, Tube Lines became a wholly owned subsidiary of Transport for London (Figure 2.1). Tube Lines remains a separate legal entity with its own systems, functions and staff. It operates a safety management system which is separate (though aligned where appropriate) to LU's safety management framework. However, as it operates as a PPP supplier to LU, the Tube Lines Chief Executive Officer (CEO) reports to the Rail and Underground Managing Director (Figure 2.2) in order to ensure effective operational governance and delivery of LU's business objectives,

The Rail and Underground Board has granted decision making powers to a number of executive groups. The LU Health, Safety, Environmental and Climate Change Programme Board make decisions with a health, safety and environment focus (Section 2.3.1). The LU Director's Risk and Assurance Change Control Team (DRACCT) considers all changes to the company (including organisational, procedural and safety changes) other than changes to scope or milestones related to The LU Plan,

programmes or projects. These changes are viewed by the Programme Board associated with each programme in The Plan on which at least one Executive Director sits. DRACCT explicitly considers the safety implications of proposed change along with all other relevant factors and implications (Section 2.3.2).

The Rail and Underground Managing Director is the Managing Director for London Underground Limited and is accountable for the health and safety of Underground customers, employees and others affected by LU operations and for fulfilling obligations as infrastructure manager for the LU network. All Executive Directors report to the Rail and Underground Managing Director (Figure 2.2). The Director of the TfL Health, Safety and Environment Directorate has responsibilities for safety management in London Underground, London Rail and TfL corporate teams. The accountabilities of this role are set out in Section 2.2.2. The role is referred to as the LU Director of HSE in this document.

To ensure management control arrangements function effectively, the Rail and Underground Board has assigned each Executive Director specific accountabilities. This means that a specified Executive Director is accountable to the Rail and Underground Board for every risk control.

The LU Executive Directors are responsible for setting corporate safety direction in LU and delivery is managed through Health, Safety, Environment and Climate Change (HSECC) Programme Board (Section 2.3.1 and Section 6.1). TfL's corporate safety direction is developed from the operational businesses (London Underground, London Rail and Surface Transport). LU shares its corporate safety direction with other parts of TfL as part of this process.

Directors and senior managers are held accountable for their performance through a variety of means, including:

- delivery of Key Performance Indicators and targets, including safety performance. This is monitored at local and Board level.
- incident monitoring, review and investigation
- compliance with the Management System which is monitored through audits, safety tours, etc.
- through the Performance and Development process described in Section 8.4.

Poor performance is managed through appropriate interventions, such as coaching, refresher training, use of a Personal Improvement Plan, etc. This process is further described in Section 8.4.

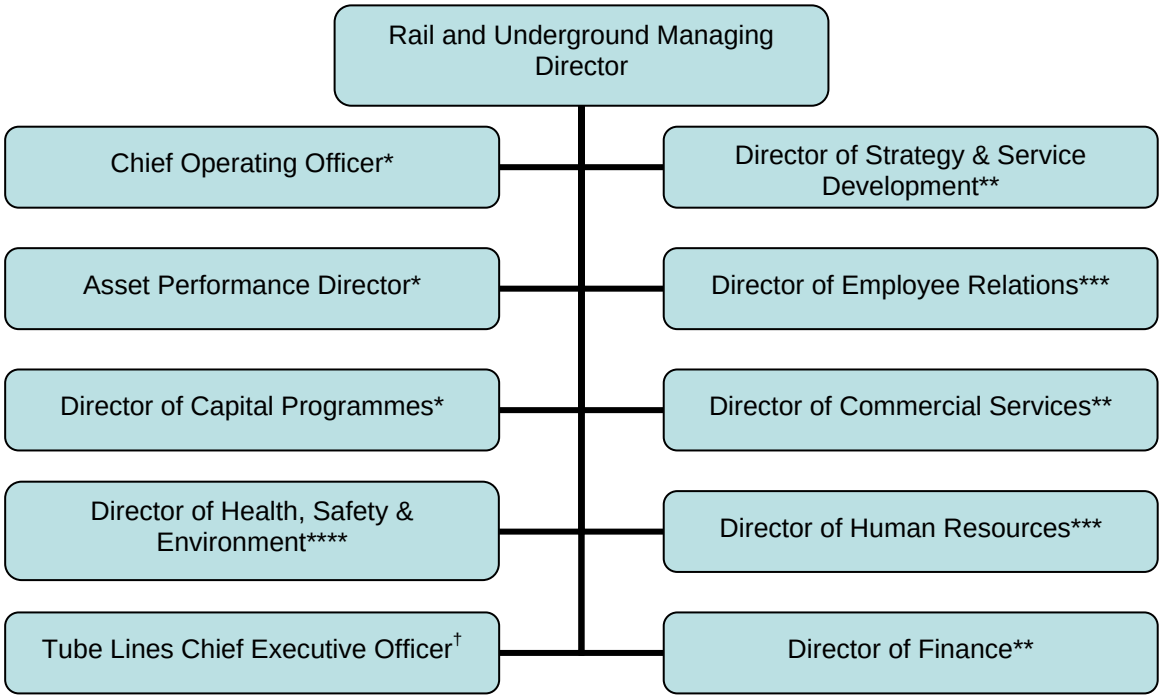

Figure 2.2 Structure of the Rail and Underground Board

* Role is LU specific
** Fulfils function across London Underground and London Rail
*** Fulfils function across TfL (LU, London Rail, Surface Transport and Support Functions)
**** Fulfils function across TfL (LU, London Rail and TfL Corporate Support Functions)
† Tube Lines is a separate company to LU. The Tube Lines CEO reports to the Rail and Underground Managing Director

The roles of the key Directorates are summarised below.

2.2.2 Health, Safety and Environment

During 2011/12, the organisation of TfL support functions was restructured to bring support functions across TfL together. The LU, LR and TfL corporate HSE directorates were merged into a single TfL Health, Safety and Environment Directorate as part of this process. The organisation structure and staff numbers of the HSE team that supports LU remained unchanged as a result of this change. The LU HSE teams are embedded in LU.

The LU Director of Health, Safety and Environment (HSE), who is an Executive Director of London Underground Limited, is accountable to the Rail and Underground Managing Director[§] for:

- providing strategic direction to LU management on health, safety and environment
- competent professional safety support to LU, which includes ensuring that LU has the necessary safety competence in place to deliver legal compliance, and to meet the requirements of LU's Management System, including relevant standards, and the professional qualifications in the relevant disciplines (as described in Section 8.3).

[§] London Underground Limited Managing Director

- maintaining an effective health, safety and environmental management system for LU.

The LU Director of HSE is accountable to the Rail and Underground Managing Director for ensuring that:

- staff who provide HSE support to LU are competent to deliver their role. All roles in the TfL HSE directorate are described in a job description. The job description sets out the requirements for the role, including HSE-specific qualifications and experience. The directorate maintains a Training Needs Analysis document which further describes the essential and desirable qualifications and certification required for roles. This includes LU specific qualifications and training requirements. The responsibilities of HSE staff who support LU are defined in more detail in the LU's Manager's Handbook: Providing safety and environment support. This is used to ensure appropriate support is provided to LU. Delivery against these requirements is reviewed as part of the Performance and Development process for HSE staff outlined in Section 8.4.
- HSE staff retain LU specific knowledge and experience, they are embedded in LU. In addition, the Head of HSE Operations and Asset Performance and Head of HSE Capital Programme Directorate have indirect reporting lines to the relevant directors.

Health, safety and environmental support and advice is provided to LU via a number of teams:

- The Head of HSE Operations and Asset Performance provides support to Chief Operating Officer and Asset Performance Director, to the Network Services team within the Chief Operating Officer's Directorate and managers within the other Central Services Directorates. The Head of HSE Operations and Asset Performance also provides specialist safety and environment support to London Underground and manages LU's HSE Information and Reporting Team. This team provides weekly, periodic, quarterly and annual reports and analysis on LU's HSE performance to the business. The Head of HSE Operations and Asset Performance also provides support to a small number of LU Central Services teams (where staff are employed by LU, rather than TfL).

- The Head of HSE Capital Programmes provides support to the Capital Programmes Directorate. This team has a close working relationship with their counterparts in Tube Lines and other suppliers and work together to promote a safe environment for any person working or travelling on or about the LU network.

- The Head of HSE Systems, Standards and Audit is responsible for the ongoing development, implementation, maintenance and improvement of the Management System to ensure that it meets LU's objectives. The Head of HSE Systems, Standards and Audit is responsible for the overall management and strategic direction of LU's standards regime including the application of change, derogation and all of the PPP Contract provisions related to standards. The Head of HSE Systems, Standards

and Audit is also responsible for management and delivery of LU's audit regime.

- The Head of Occupational Health develops, maintains and reviews the health and fitness of staff and sets fitness standards for suppliers and contractors.

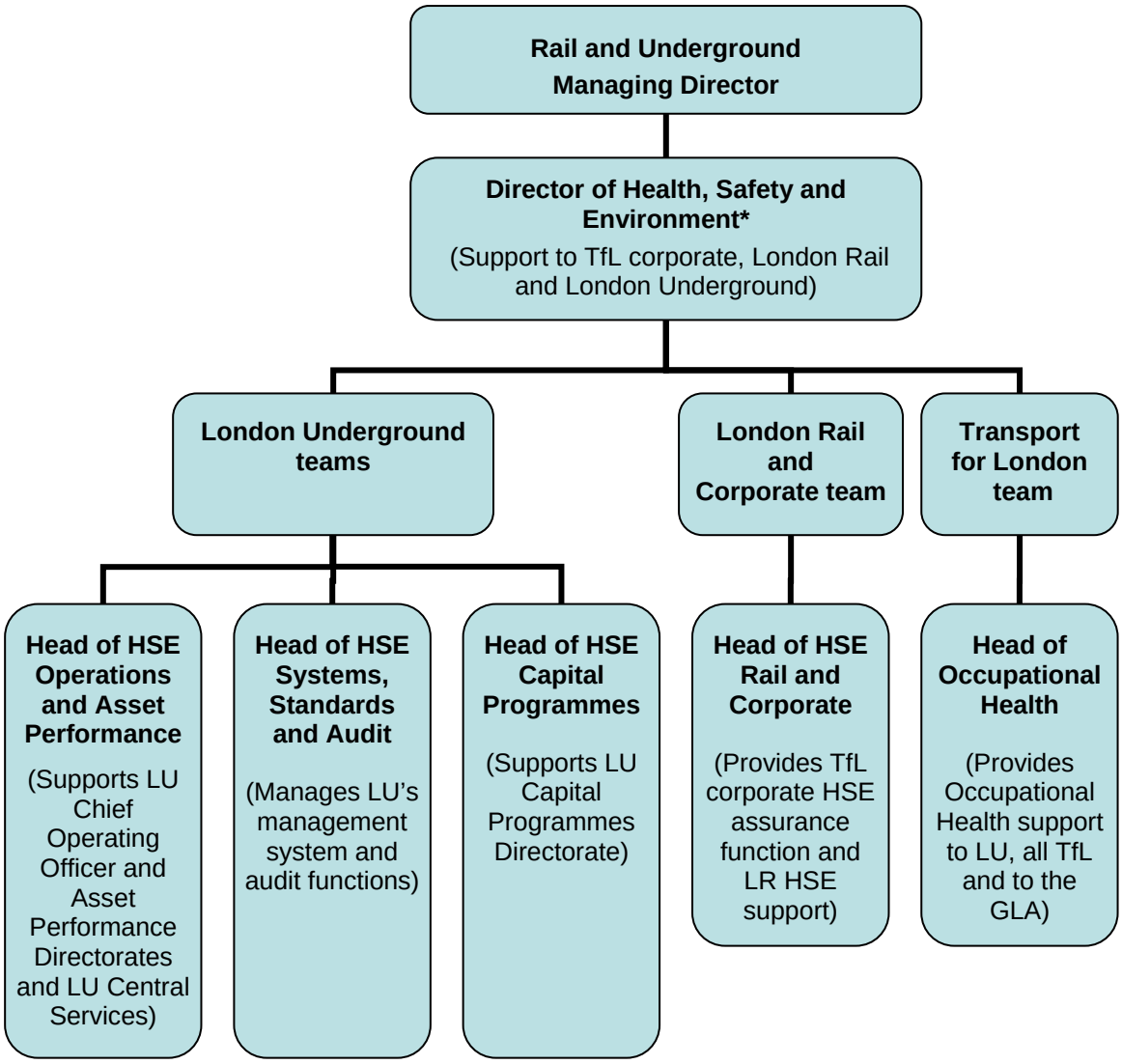

Figure 2.3 Structure of the HSE Directorate

* The LU Director of Health, Safety and Environment has responsibilities for safety management in London Underground, London Rail and TfL corporate teams. This document focuses on the London Underground elements of this role.

The TfL Health, Safety and Environment (HSE) Directorate also provides competent health, safety and environmental support and advice to London Rail and TfL corporate support functions, and HSE assurance for TfL to the TfL Board.

The following Directorates also have safety significant roles:

- Chief Operating Officer
- Asset Performance Directorate
- Capital Programmes Directorate
- Commercial Services
- Human Resources.

2.2.3 Chief Operating Officer – organisation and HSE accountabilities

The Chief Operating Officer is a member of the Rail and Underground Board with overall accountability for the delivery of LU train and station services and in doing so implementing and complying with arrangements for HSE management. These are delivered via the Line General Managers and the Network Services Director who all report to the Chief Operating Officer. The senior level organisation of the Chief Operating Officer is set out in Figure 2.4.

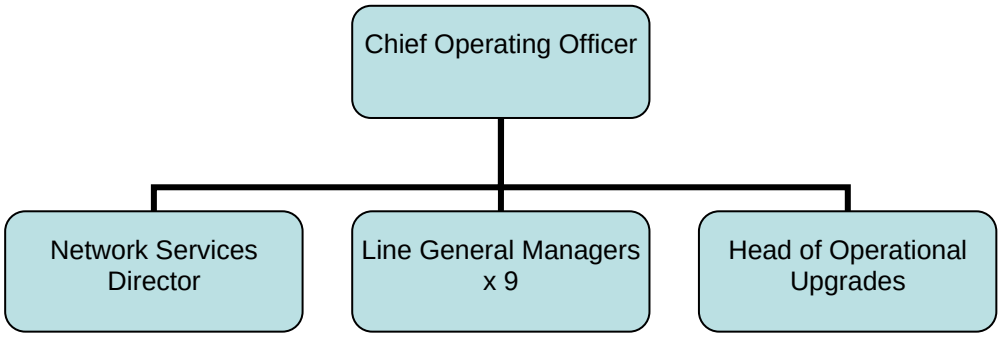

Figure 2.4 Chief Operating Officer – Senior Level Organisation

The key HSE accountabilities of the Chief Operating Officer's Directorate are described below. The following diagram (Figure 2.5) shows how operational management is organised within COO.

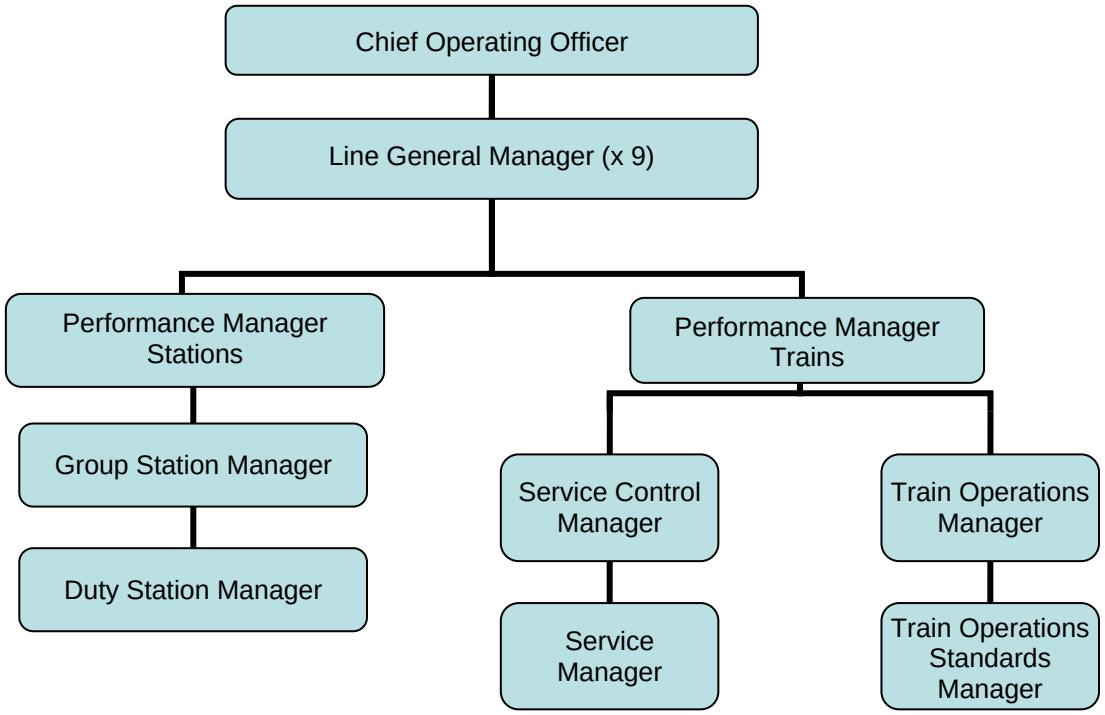

Figure 2.5 Chief Operating Officer – Top Level Organisation

* The Service Control Manager Central Line is also accountable for the Waterloo & City line and Duty Reliability Managers provide the duty management role for train roles. There are no Train Operations Managers, Train Operations Standards Managers or Duty Staff Managers specifically for the Waterloo & City line. Train crews are provided by the Leytonstone train crew depot.

2.2.4 Line General Managers

Each of LU's lines is managed by a Line General Manager (LGM) who is accountable for the safety of customers, employees and others affected by the operation of that Line. The Line General Manager is accountable for train operations, service control and station operations and for ensuring that the LU arrangements for HSE management are implemented. The LGM is responsible for escalating safety concerns to the Chief Operating Officer where appropriate. The LGM is also accountable for:

- monitoring the safety performance of the operational staff and customers for which the LGM has responsibility and taking corrective action as necessary
- being personally visible through tours and visits undertaken at appropriate intervals to discuss concerns with staff and Health & Safety Representatives to ensure potential issues are addressed
- monitoring safety performance reports, incident reports, in order to monitor the safety performance and concerns of staff
- commissioning Formal Investigations into accidents and incidents (including near misses) where necessary.

2.2.5 Performance Managers

Performance Managers are accountable for train operations, service control and station operations for the Line. Performance Managers, who report to the Line General Manager, have the following HSE related responsibilities:

- ensuring that the Line General Manager's accountabilities are being discharged effectively within the relevant trains, service control or station operations functions,
- monitoring the safety performance for their designated business unit and taking corrective action as necessary, and
- escalating HSE concerns to the Line General Manager as appropriate.

2.2.6 Train Operations, Service Control, Group Station and Revenue Control Managers (Centurion Managers)

These managers report to a Performance Manager for either train operations/service control or for station operations. This group of managers are often referred to, collectively, as centurion managers. Their key safety management responsibilities are:

- ensuring compliance with the Manager's Handbooks in the areas for which the Centurion has management responsibility
- personally conducting risk based safety system checks (to identify whether assets, implementation of operational procedures, and staff competences are satisfactory)
- ensuring that Duty Managers carry out risk based Planned General Inspections
- undertaking the assessment of risks to staff and customers from the operation of the areas from which the Centurion has responsibility
- seeking advice, as necessary, from the Head of Engineering (Capital Programmes) and HSE Directorate in the evaluation of risks
- commissioning local investigations into incidents and accidents which do not require a Formal Investigation
- gaining assurance that relevant staff competence is maintained
- ensuring that local emergency plans are maintained and that emergency exercises are undertaken
- escalating safety concerns to line management where notified asset safety issues have been raised with Asset Performance Directorate (APD) or Tube Lines but not resolved
- gaining assurance from Capital Programme Directorate (CPD), Tube Lines, PFI and other suppliers that risks to customers and staff will be adequately controlled during the course of works which affect their area of responsibility
- seeking assistance from HSE and/or the Head of Engineering (Capital Programmes) in assessing the potential safety impact and necessary mitigating measures arising from engineering works.

2.2.7 Train Operations and Service Control

Each Train Operations Manager (TOM) has a number of Train Operations Standards Managers and Duty Train Staff Managers reporting to them. These managers are the management interface with Train Operators and work on a shift basis to provide 24 hour coverage. Their duties include:

- managing Train Operators on behalf of the Train Operations Manager
- assessing Train Operators' fitness when booking on and following an incident
- assessing the competence and on-going performance of Train Operators via Performance & Development discussions and formal assessment
- managing and investigating incidents at a local level
- managing the train and station service interface to ensure safe operation
- ensuring that competence management assessments are revalidated before expiry
- the introduction, monitoring and reviewing of Line Standards, to meet competence assurance requirements
- ensuring consistency of application of Line Standards
- the ongoing training and monitoring requirements of Train Operators and Service Control Managers. Recruitment and training is the responsibility of the Network Learning team in the Network Services team.

Train Operators are responsible for operating trains in accordance with the timetable, signals and operational rules.

2.2.8 Service Control

Service Control Managers have teams reporting to them via Service Managers consisting of Duty Reliability Managers, Service Operators (Signals), Information Assistants and Service Controllers. This team undertakes:

- operation and monitoring of service control equipment in a designated area to optimise the safe and efficient operation of train services whilst providing train service information to customers and other operational management
- monitoring, recording and signalling of trains through designated areas, operating multi-site signalling equipment including emergency back-up systems ensuring safe and efficient train services
- competence management of relevant staff
- proactive prevention of incidents, line performance reviews and investigation of reasons for poor service performance and develops ways to improve performance.

2.2.9 Station Operations Management

A Group Station Manager (GSM) is accountable for the station operations, supported by Duty Station Managers (DSM). The Group Station Manager reports to the Line Performance Manager stations. Duty Station Managers are the management interface with station staff. They work on a shift basis to provide 24 hour coverage. Their duties include:

- deploying staff to meet service and safety requirements
- managing staff on behalf of the Group Station Manager
- monitoring hours worked by station staff
- undertaking regular safety inspections in line with the Manager's Handbook
- managing incidents and emergency situations at a local level in accordance with operational standards and the Congestion Control and Emergency Preparedness Plan for each station
- managing the train and station service interface to ensure safe operation
- identifying training for staff including assault awareness and customer awareness training
- ensuring that competence management assessments are revalidated before expiry.

Each station is run by a Station Supervisor. The number of Supervisors allocated to a particular station reflects the station's size, type (e.g. sub-surface) and operational risks. Station Supervisors are the first line of management within the station. They are responsible for deployment and supervision of Customer Service Assistants and Station Assistant Multi-Functional. As well as these supervisory activities, they have the following responsibilities:

- opening and closing the station
- regularly inspecting the station to monitor safety, security and operational matters
- reporting defects to the Fault Reporting Centre
- making sure that the station complies with the Fire Precautions (Sub-Surface Railway Stations) (England) Regulations and Regulatory Reform Order (Fire Safety), if applicable
- recording incidents for evidence and future investigations
- making sure that contractors' and suppliers' staff do not adversely affect the integrity of station operations and have the required authority and/or licences to enter controlled access areas
- managing permission for supplier access when authorised where circumstances warrant this in accordance with the Rule Book
- co-ordinating the local response to emergency situations, directing controlled evacuations, liaising with the emergency services as necessary and debriefings after evacuations.

Each station holds a Congestion Control and Emergency Plan (CCEP) which addresses foreseeable risks and response at the station. The plans cover congestion control, evacuations and summarise emergency response/incident management arrangements. The CCEPs are reviewed at intervals defined in the Manager's Handbook in respect of emergency plans and following changes or incidents.

Where other Train Operating Companies (TOCs) operate at stations where LU is the Infrastructure Manager, the GSM is responsible for station management and the relevant TOC is responsible for its train operations in line with the relevant agreements (set out in Sections 12.6 – 12.9).

2.2.10 Network Services Director

The Network Services Director has day to day accountability for delivery of support services to the front line operational staff, to ensure the safety of customers, employees and others. The support activities that have HSE implications are set out below:

- developing and delivering training for operational staff, including training in safety critical activities
- maintenance and development of operational standards
- the development of competence standards for operational staff, including standards for competence in safety critical activities
- maintaining station fire compliance plans and assessing and managing compliance submissions to LFEPA resulting from engineering works
- controlling access to LU's infrastructure and for monitoring the protection of those working on or about the track
- management of traction current switching arrangements and for provision of safe access arrangements to the track environment through the Track Access Control Team
- management and operation of the LU Network Operations Centre
- co-ordination of emergency planning, exercises and training, liaising with other transport providers, the emergency services and relevant agencies where necessary
- maintenance and development of the network emergency preparedness plans
- provision of reserve station staff via the Special Requirements Team Manager available across the network to cover demands for extra staff; for example when there are station refurbishments, large events and line closures
- providing additional resources for major event incidents, for example Incident Customer Service Assistants
- working with Network Rail and other transport undertakings
- Liaison with BTP and security bodies and advising on appropriate security and resilience measures to manage safety risks associated with security issues.

2.2.11 Asset Performance Director

The Asset Performance Director (APD) is a member of the Rail and Underground Board and has overall accountability for:

- maintaining a comprehensive register for all assets on the Bakerloo, Central, Circle, District, Hammersmith & City, Metropolitan, Victoria and Waterloo & City lines
- identifying, understanding and managing risks to safety and service from relevant assets and improving where reasonably practicable
- maintaining assets to an acceptable standard
- maintaining assets on the basis of whole life cost analysis
- improving asset management using new technology and best practice
- maintaining the safety and reliability of assets or equipment in accordance with engineering standards and instructions

- employing suitably competent, qualified resources to maintain assets,
- training and, where appropriate, licensing staff
- responding to, and dealing with, reported asset faults
- analysing failure trends to improve maintenance performance
- providing adequate resources to meet maintenance plans
- working collaboratively with colleagues across LU and Tube Lines to ensure effective sharing of information and good asset maintenance practice
- introducing new or modified equipment in line with LU's change control process and in accordance with relevant legislation.

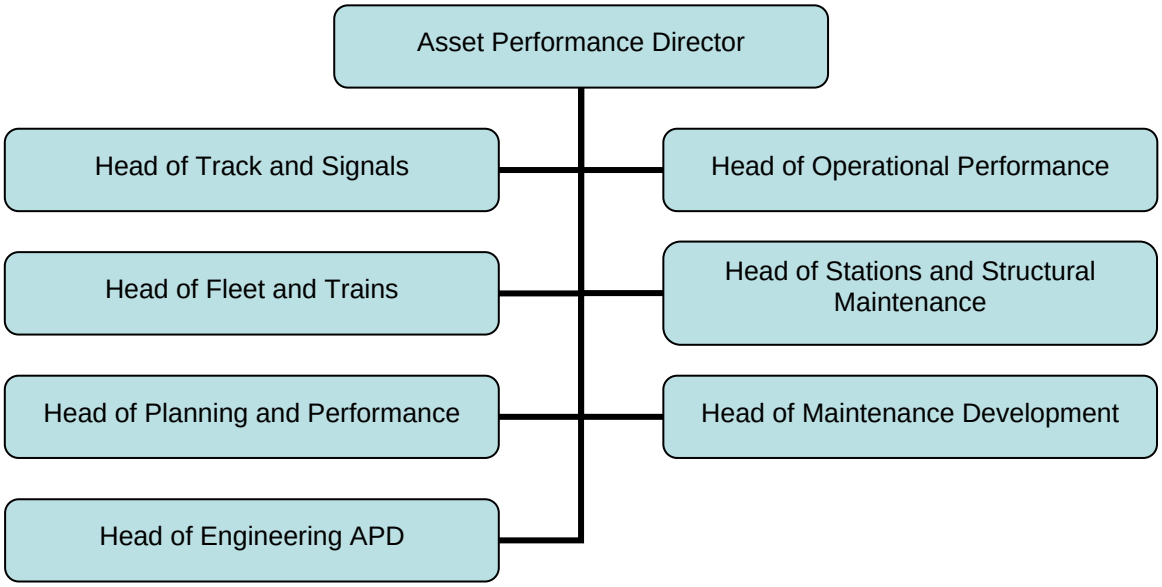

Figure 2.6 Asset Performance Director – Top Level Organisation

APD implements and complies with LU's arrangements for HSE management. The delivery of maintenance is achieved through the Heads of Track and Signals, Stations and Structural Maintenance, Fleet and Trains and Maintenance Development. The top level organisation of the Asset Performance Directorate is set out above (Figure 2.6).

The key health and safety accountabilities of key roles in the Asset Performance Directorate are described below.

2.2.12 Heads of Track and Signals, Stations & Structural Maintenance and Fleet & Trains

The Heads of Track and Signals, Stations & Structural Maintenance and Fleet & Trains have day to day responsibility for ensuring the implementation of the LU asset maintenance regimes for their respective asset areas and for the health and safety of employees. The key aspects of their responsibilities for delivering the asset maintenance regimes are:

- maintaining assets in line with maintenance standards and regimes
- ensuring that work is planned in accordance with the annual asset management plan and to minimise safety risks

- implementing the LU arrangements for HSE management including compliance and the management of non-compliance with the standards regime described in Section 2.4.

2.2.13 Head of Operational Performance

The Head of Operational Performance reports to the Asset Performance Director and is responsible for:

- managing the Fault Reporting Centre and the Maintenance Control Centre covering the BCV (Bakerloo, Central and Victoria lines) and SSR (Circle, District, Hammersmith & City, Metropolitan and Waterloo & City lines) networks
- ensuring relevant emergency response and planning systems are in place
- supporting planning for special events
- providing information systems and services concerning asset performance
- managing asset information systems
- managing the Access Code
- managing timetable changes
- controlling planned access to LU infrastructure ensuring that resources can be matched to planned work
- managing operational security including depot and infrastructure resilience, people security, ensuring compliance with current legislation and providing security advice to other parties such as suppliers.

2.2.14 Capital Programmes Director

The Capital Programmes Director is responsible for delivery of LU's upgrade projects and capital programmes, including the safe design and delivery of new infrastructure (either directly or through third parties). The Capital Programmes Director ensures the delivery of actions through Programme Assurance by suppliers that are essential for the maintenance and the reduction of risk on the LU network.

The Head of Engineering (Capital Programmes) provides competent engineering advice and support across LU. The Head of Engineering establishes standards in relation to assets and seeks assurance that assets are designed, constructed, installed and maintained in accordance with those standards. The Head of Engineering has overall accountability for LU's safety verification process. Details on how independence in the safety verification process is ensured and maintained is set out in Section 7.7.The Head of Engineering is supported by Heads of Profession for the relevant engineering disciplines.

2.2.15 Human Resources

Human Resources (HR) plays a key role in establishing competence criteria for staff and establishing appropriate performance management arrangements. The Human Resources Directorate also monitors the drugs and alcohol testing programmes. Further detail is set out in Section 8.

2.2.16 Tube Lines

The Tube Lines Chief Executive Officer is a member of the Rail and Underground Board and has overall accountability for:

- maintaining a comprehensive register for all Jubilee, Northern and Piccadilly (JNP) assets (as specified in the PPP contract)
- identifying, understanding and managing risks to safety and service from relevant assets and improving where reasonably practicable
- maintaining assets to an acceptable standard
- maintaining assets on the basis of whole life cost analysis
- improving asset management using new technology and best practice
- maintaining the safety and reliability of assets or equipment in accordance with engineering standards and instructions
- employing suitably competent, qualified resources to maintain assets
- training and, where appropriate, licensing staff
- responding to, and dealing with, reported asset faults
- analysing failure trends to improve maintenance performance
- providing adequate resources to meet maintenance plans
- introducing new or modified equipment, with LU agreement and in accordance with appropriate legislation
- working collaboratively with colleagues across LU and Tube Lines to ensure effective sharing of information and good asset maintenance practice
- safety operation of engineering trains, including maintenance of TransPlant's Safety Certificate.

Tube Lines implements and complies with LU's arrangements for HSE management as specified in the PPP contract and LU's Category 1 standards. The Rail and Underground Managing Director is the Chairman of the Tube Lines Board.

2.3 Governance

The significant HSE risks for LU arise from the operation of train and station services, train and asset maintenance and from the control of access to LU infrastructure. Consequently, the key HSE accountabilities are vested in the Chief Operating Officer, Capital Programmes Director and Asset Performance Director with support from the other Executive Directors and the Tube Lines Chief Executive Officer. HSE accountabilities are aligned to the relevant directors to ensure the delivery of a safe operational railway.

The Rail and Underground Directors are accountable for making decisions to ensure that HSE is effectively managed in the course of LU operations and achieving business aims. Each of the Executive Directors is accountable individually for:

- implementing these decisions within their areas
- controlling the significant risks associated with the activities they are accountable for
- implementing the requirements of arrangements for HSE management
- ensuring that risk controls systems are implemented and effective.

The Rail and Underground Board (RUB) is made up of directors including LU and LR Executive Directors, the Tube Lines Chief Executive Officer and TfL Directors. RUB is accountable for making strategic decisions which govern London Underground and London Rail and for managing risks significant to LU's business objectives. These include HSE risks. The LU Executive Directors are accountable for:

- determining high level policies, including the Health, Safety and Environment Policy
- approving budgets
- setting strategic plans and objectives, including safety plans and objectives
- approving any other proposals materially affecting LU's policies or corporate aims
- managing the safety risks associated with all aspects of the operation of the LU network
- reviewing overall safety performance.

In order to assist in ensuring that the collective accountabilities of the LU Executive Directors are discharged within a clear management framework, LU has established the Health, Safety, Environment and Climate Change Programme Board. This is supported by the LU Directors' Risk and Assurance Change Control Team (DRACCT).

2.3.1 LU Health, Safety, Environment and Climate Change Programme Board

Chaired by the Rail and Underground Managing Director or the LU Director of Health, Safety and Environment, the Health, Safety, Environment and Climate Change (HSECC) Programme Board meets quarterly. It acts as the top-level forum for discussing operational and engineering issues in the context of HSE improvement strategy. The Programme Board members include the Rail and Underground Managing Director, Director of Strategy and Service Development, Chief Operating Officer, Asset Performance Director, Capital Programmes Director, Tube Lines' Chief Operating Officer, Tube Lines' Director of Safety and TfL Director of Human Resources. Other senior management representatives from across LU, and TfL where they provide support to LU, also attend the Programme Board meetings. The HSECC Programme Board:

- determines corporate HSE policy and strategy
- sets corporate safety objectives
- reviews progress towards these objectives
- holds directors and senior managers to account for devising, resourcing and implementing strategies to meet objectives
- reviews safety performance and agrees and monitors performance improvement programmes
- approves safety and technical audit programmes and reviews the results of audits.

2.3.2 LU Directors' Risk, Assurance and Change Control Team

The LU Directors' Risk, Assurance and Change Control Team (DRACCT) undertakes an important peer review role within LU under delegation by RUB. The group is chaired by an Executive Director appropriate to the agenda and includes Directors or their nominees from all parts of LU/TfL who, in combination, bring operations, safety, engineering, human resources, planning, finance and company knowledge and experience. Tube Lines also sit on DRACCT. The group meets at least every four weeks and may meet more frequently if needed. Its core role is the peer review of:

- significant HSE changes in respect of processes, technology, operational arrangements, engineering works, organisational change and safety improvement actions (as set out in Section 7.2)
- when Independent Safety Verification is required
- formal investigations in terms of their adequacy and the outputs in terms of Formal Investigation Reports (FIR) and improvement programmes
- all Rail Accident and Investigation Board (RAIB)/Office of Rail Regulation (ORR) reports concerning LU or Tube Lines
- changes to standards and procedures
- Operational Safety Plans.

DRACCT is supported by various filter groups that deal with less significant changes.

2.4 LU Management System

LU operates a Management System that includes a document management framework. The objective of this framework is to ensure that instructions and requirements are developed consistently and are clear to the user. All documents in the Management System are available to all LU and TfL staff on the LU intranet and to suppliers through a specific internet site.

Where other operating companies use LU's infrastructure or LU operates on Network Rail infrastructure/uses other operating companies' infrastructure, appropriate agreements are put in place to allow access to the relevant parts of the Management System (as described Section 12.6).

2.4.1 Policies and handbooks

LU's Health, Safety and Environment Policy is a statement of intent, agreed by the Rail and Underground Board, which describes the principles the Company, will adopt in order to achieve its objectives. This is signed by the Rail and Underground Managing Director. LU's policy and handbooks provide direction and instruction and, together with standards, are a significant element of arrangements for managing health, safety and environmental risks.

2.4.2 LU standards regime

Standards set the performance levels of LU and suppliers. They prescribe where necessary for safety, consistency in the LU environment. LU standards are informed by British, European and International standards, legislation and TfL and LU policies. The

Rule Books are classified as instructions for staff – mandatory documents which relate to LU assets and operations.

LU introduced the Manager's Handbooks in 2009 and has developed them further since then. The Manager's Handbooks are classified as Category 5 standards, i.e. mandatory documents for employees, and are fully integrated into LU's Management System (Figure 2.7). Handbooks have been developed to cover all managers or they apply specifically to one part of the business, e.g. COO, CPD or APD.

The CPD Manager's Handbook is known as the Project Management Framework (PMF). The Project Management Framework (PMF), which is part of LU's Management System, sets mandatory requirements for delivery and management of LU programmes and projects (with a small number of exceptions). The PMF sets a clear and consistent framework for those involved in programme and project delivery. It includes support, training, information and tools to support project delivery.

The Handbooks were introduced to make instructions/requirements as clear to relevant managers as possible. Handbooks can be accessed through the Management System section on the LU intranet. Changes to the Manager's Handbooks are managed via the Change Control Process described in Section 7 (and in the relevant Manager's Handbook).

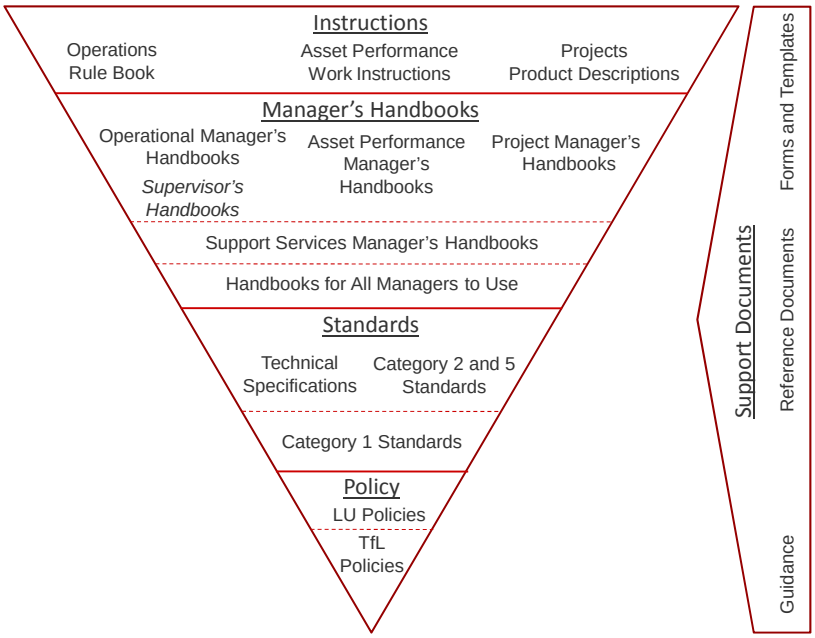

Figure 2.7 The Management System Documentation

All standards are issued with a category. The categories are:

- Category 1: LU standards which are mandatory on LU and all suppliers due to their importance in safety, asset performance or where consistency is required in a process or activity

- Category 2: LU or Tube Lines standards. The change control for Category 2 standards is mandated through the LU Category 1 Standard: Category 2 Standards
- Category 5: LU standards which are mandatory within LU only.

LU's management arrangements with Tube Lines contain the Standards Code which mandates compliance with Category 1 standards. Category 1 standards can be translated by Tube Lines and LU into Category 2 standards that describe how performance is met. They define the specifics necessary to meet the Category 1 standards. LU is able to use the Category 2 Tube Lines standards to define performance requirements for assurance activities, and vice versa.

The standards that apply to the PFI Suppliers are referenced in the PFI contracts.

Within LU, Category 1 standards may be supported by Category 2 or 5 standards and/or, where necessary, by local procedures and work instructions.

2.4.3 Maintaining documents

In accordance with LU's principles of risk ownership and accountability, designated managers are responsible for developing the content of standards and making sure that they are up to date. Directors are accountable for ensuring compliance with LU's Management System, including standards, in their directorate.

Tube Lines is responsible for keeping its Category 2 standards under review. This includes identifying which Category 2 standards fail to comply with the ALARP principle. The outcome of such a review may be proposals for new Category 2 standards or revisions to existing Category 2 standards.

Section 7.4 describes arrangements for the introduction of new or revised LU Management System documents including standards and controlling change. Tube Lines must operate controlled processes, via a Category 1 standard, to manage its standards safely.

2.4.4 Management control

Throughout the Management System, defined accountabilities and corresponding responsibilities have been developed. They range from corporate level policy development through to line management implementation of the system. By ensuring compliance with the Management System, which includes standards, LU is able to deliver consistency, manage, minimise and mitigate system risk and ensure the safe operation of the LU network.

Compliance with the Management System and standards (by LU and contractors) is ensured through local HSE monitoring, including senior management tours, safety and technical assurance processes, verification and audit as described in Sections 2.5.4, 2.7 and 11. This is supported by relevant training and competence management.

The HSE Change Control and Standards Manager is responsible for managing LU's processes that relate to the Management System change and standards management as far as they affect LU.

2.4.5 Queries to standards

The formal mechanism to query or ask for clarification of standards is set out in Category 1 Standard: Queries to Standards. This allows staff to raise issues relating to standards, e.g. resolving disputes on the intent behind a standard, correcting errors/conflicts with another standard, etc.

LU issues a formal response via a written notice. The written notice is then attached to the standard. Queries and their associated written notices are communicated to all members of the LU Group via the periodic LU Standards Bulletin.

2.4.6 Relationship with Railway Group Standards

LU is not a member of the Railway Group, but complies with relevant Railway Group Standards (RGS) where it operates over Network Rail infrastructure, i.e. the District line and Bakerloo line. Agreements are made with Network Rail about application of the relevant Railway Group or LU requirements as set out in Sections 12.7 and 12.9. The HSE Directorate, in consultation with appropriate competent individuals within LU, decides applicability of the RGS to LU's operations and status in terms of direct compliance, or compliance via LU equivalent standards.

A central point of contact exists within the HSE Directorate to ensure that relevant standards and proposed changes are circulated to appropriate competent individuals for review. Comments are then consolidated and returned to Railway Safety and Standards Board (RSSB). When a new standard is published, its impact is assessed and where appropriate, amendments are made to LU standards or procedures, or derogation is sought if required. Where the need for a derogation is identified, this derogation is requested from RSSB in accordance with Railway Group Standards GA/RT6004 'Temporary Non-Compliance with Railway Group Standards' and GA/RT6006 'Derogations from Railway Group Standards'. LU's process is set out in the LU Category 5 Standard: Railway Group Standards Reconciliation Process.

2.4.7 Management of non-compliance to standards

By ensuring compliance with standards, LU can deliver consistency, manage, minimise and mitigate system risk and ensure the safe operation of the LU network. However there are occasions when it is not possible or desirable to comply with a particular standard. In these circumstances LU has two mechanisms for dealing with non-compliance: Temporary Approved Non Compliance and Concessions.

2.4.8 Temporary Approved Non Compliance

The arrangements for Temporary Approved Non Compliance (TANC) are defined in the LU Category 1 Standard: The Management of Temporary Approved Non-Compliance (TANC). This requires the regularisation of non-compliances which are either discovered through routine maintenance or through asset inspection or audits. The requirements are designed to manage the risk arising from the non-compliance in the environment in which it is discovered. The standard requires a competent TANC authorised person to undertake a risk assessment, the process for which must be in accordance with the LU Category 1 Standard: Assessment and Management of Health, Safety and Environmental Risk. The risk assessment allows the TANC Authorised

Person to record the non-compliance, the risks arising and the mitigation required in order to keep the asset in service. In the event that appropriate mitigation cannot be implemented the asset is withdrawn from service.

The TANC authorised person is also required to develop a TANC management plan which records all the details of the non-compliance, the results of the risk assessment, the mitigation implemented and the date by which full compliance with the relevant standard will be achieved. TANC management plans are required to be reviewed by the designated LU or Tube Lines TANC competent authority, normally the Professional Head, in order to confirm their validity. LU is given visibility of Tube Lines' TANCs and their status via the relevant Asset Performance Review Meeting.

In the event that the agreed time-scale for achieving compliance will not be met, a concession against the standard is required to be sought.

The TANC process applies solely to LU standards.

2.4.9 Concessions to standards

The LU concessions process is the mechanism by which all identified non-compliances with LU standards are regularised. An integral part of a concession request is a safety assessment, in line with LU's change management principles. In reviewing the concession request, the LU responsible manager, supported where necessary by an HSE Adviser, will consider the safety implications of the concession. The most safety significant concessions are subject to peer review by the LU Directors' Risk and Assurance Change Control Team.

2.5 Structure and key elements of LU's HSE management arrangements

LU's Health, Safety and Environmental Management System (HSEMS) provides the structure and framework within which health, safety and environmental risks are managed. The key objectives of HSEMS are to:

- set out the strategic management arrangements and processes by which the commitments within the Health, Safety and Environmental Policy are met
- allow management of risks to a level that is 'as low as reasonably practicable' (ALARP).

These arrangements, when taken together, are the means by which LU protects staff, customers and the environment, meets its health, safety and environmental objectives and ensures compliance with legislative requirements.

The LU Director of Health, Safety and Environment is accountable to the Rail and Underground Board for the development, implementation, maintenance and improvement of the HSE management arrangements to ensure that they meet the above objectives. Responsibility for this is delegated to the Head of HSE Systems, Standards and Audit. The responsibility for implementing the HSE requirements in the Management System lie with local line managers, as set out in the Management System.

Each Director is accountable for discharging the general requirements set out in HSE standards within their areas of responsibility and providing, maintaining and implementing risk controls for significant health, safety and environmental risks for which they are accountable.

For operational areas, these risk controls are mainly set out in the LU Rule Book. For assets, they are mainly found in engineering standards. As infrastructure manager, LU imposes performance standards on its partners and other suppliers. The performance standards that are part of safety arrangements are communicated at the management arrangement level as Category 1 Standards.

The structure of the model adopted by LU is based on the principle of continuous improvement and takes an integrated approach to health, safety and environment. It is outlined in Figure 2.8 and it consists of five main elements:

1. HSE Policy
2. Planning
3. Implementation and operation
4. Assurance and corrective action
5. Management review.

This model is promoted through “OHSAS 18001 Occupational Health and Safety Management Systems – specification”, “BS8800 - Guide to Occupational Health and Safety Management Systems” and “ISO 14001 Environmental Management Systems”. It follows the principles of the “Health and Safety Executive’s Guidance HSG 65 - Successful Health and Safety Management.”

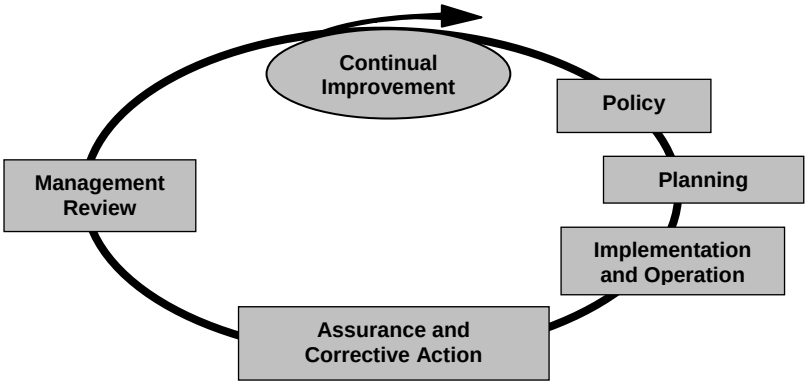

Figure 2.8 Structure of LU Health, Safety and Environmental Management System

Within each element of this framework, LU has defined the high level requirements for health, safety and environmental management as Category 1 Standards applicable to LU and its suppliers. Where further detail is necessary, Manager’s Handbooks or supporting Category 5 Standards have been developed to implement these requirements. These are delivered through the HSEMS documentation and other related sub-systems.

The sections below demonstrate how LU's Management System meets the five key elements outlined above.

LU and its suppliers are required to meet LU Category 1 standards, including those which set out LU's HSE management arrangements. They achieve this through their own management systems and safety plans.

Although each Director is accountable for demonstrating compliance with relevant requirements, the nature of the Management System encourages feedback and proposals for change/improvement from all levels. Changes to the Management System are made through the Change Control process described in Section 7.

2.5.1 Health, Safety and Environment Policy

The Health, Safety and Environment (HSE) Policy sets out LU's overall health, safety and environmental aims and gives a commitment to improving health, safety and environmental performance. It is authorised by the Board and sets out the principles of action for the organisation.

The Policy is signed off by the Rail and Underground Managing Director. It is communicated with all employees during the induction process and it is displayed on Health and Safety notice boards (Section 9.2). The Health and Safety notice boards are maintained by local managers in all locations.

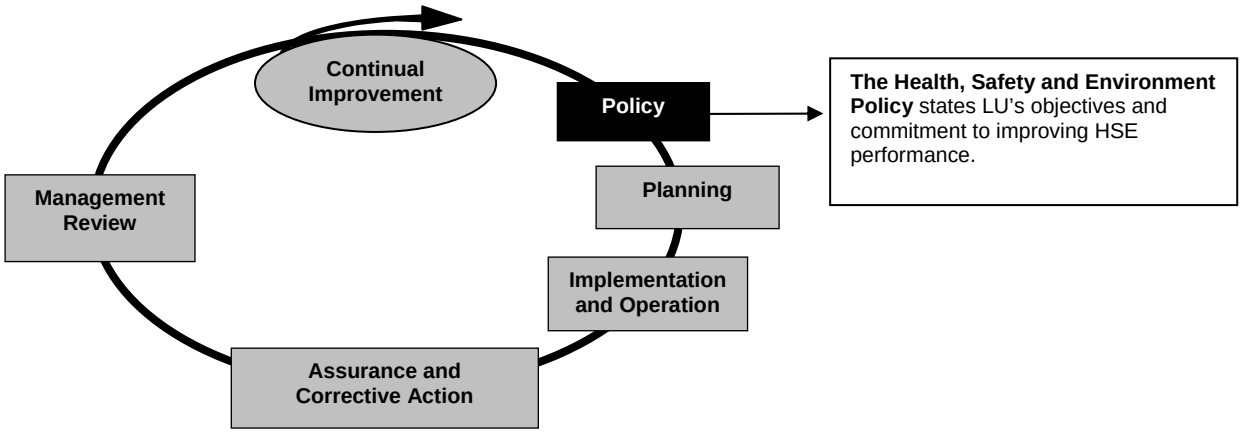

Figure 2.9 HSE Policy

The statements contained within the policy are relevant to each of LU's significant risks as they direct management arrangements. The commitments set out in the policy are articulated through specific requirements in the Manager's Handbooks and/or LU standards and associated documents. The Health, Safety and Environment Policy is reproduced in Annex 2A.

2.5.2 Planning for health, safety and the environment

This element of the Management System includes arrangements for the ongoing identification of hazards, assessment of risks and the implementation of necessary control measures. It includes arrangements for the identification of applicable legal requirements and the establishment of health, safety and environmental objectives and programmes for their achievement.

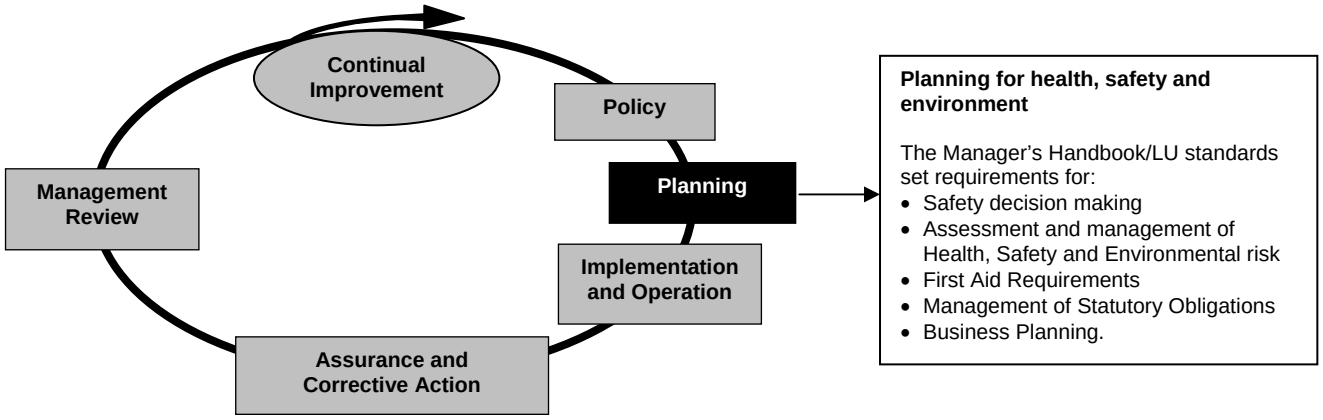

Figure 2.10 Planning

The planning processes enable LU to determine priorities based on business needs and significant risks. These arrangements ensure that decision-making enables the provision of sufficient resources to meet the requirements of the Health, Safety and Environmental Policy.

Planning occurs at all levels of the organisation and at all levels of management control. These requirements ensure that:

- safety is a key element in management decision making and that changes are reviewed and approved before implementation in respect of their health and safety implications
- health and safety is considered in all business planning activities
- responsibilities are allocated for the management of health, safety and environmental performance
- emergencies and incidents are adequately prepared for and managed.

2.5.3 Implementation and operation

The requirements for implementing LU's policy and planning requirements are contained in various LU standards.

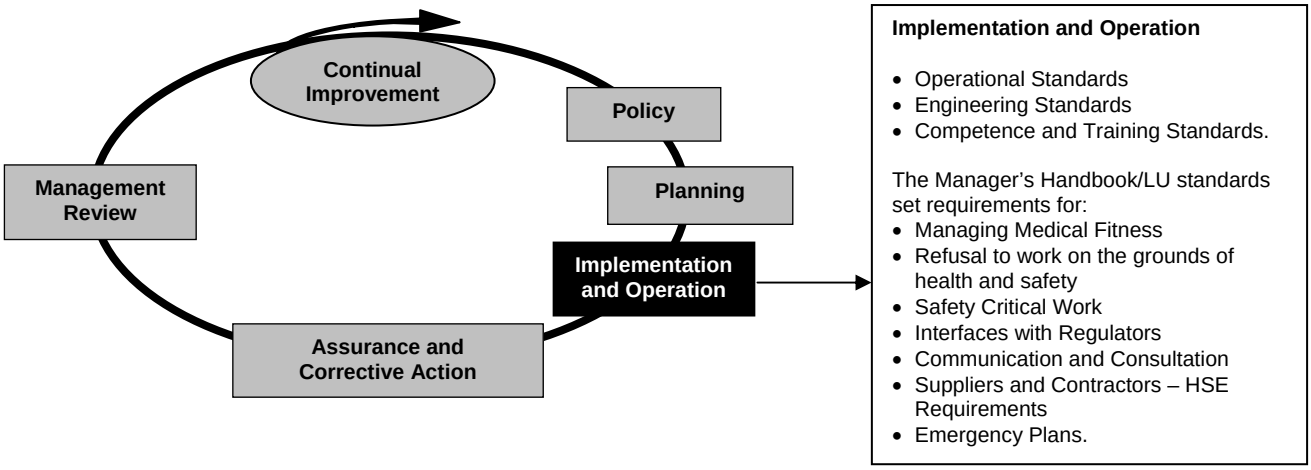

Figure 2.11 Implementation and operation

When implemented these requirements ensure that:

- assets are operated, maintained and managed effectively and standards established for safe operation and maintenance of assets
- assets are managed safely at all stages of the asset life-cycle
- projects are effectively managed in relation to health and safety risks
- safe systems of work are developed and implemented
- health and safety risks are properly managed in the process of procuring and managing work carried out by suppliers
- there are effective arrangements for managing the physical and mental well-being of employees.

The requirements in the Manager's Handbook and/or standards define, document and communicate the roles and responsibilities of employees who manage, perform and verify activities which have an impact on health, safety and environmental risks. The Manager's Handbook/standards also define competence and contain the arrangements to be established for communication and consultation on health, safety and environmental matters.

At all levels of management control, individuals are accountable or responsible for meeting minimum prescribed conditions and standards. These conditions and standards specify:

- what must be achieved
- why it must be achieved
- when it must be achieved by
- how it is to be achieved.

Accountabilities and responsibilities in respect of each component of the HSE management arrangements can be found in the relevant section of this document. Compliance with accountabilities and responsibilities is enforced through LU's performance management system.

2.5.4 Assurance and corrective action

This element of LU's management arrangements sets requirements for regular monitoring of health, safety and environmental performance and the need to take corrective action where necessary.

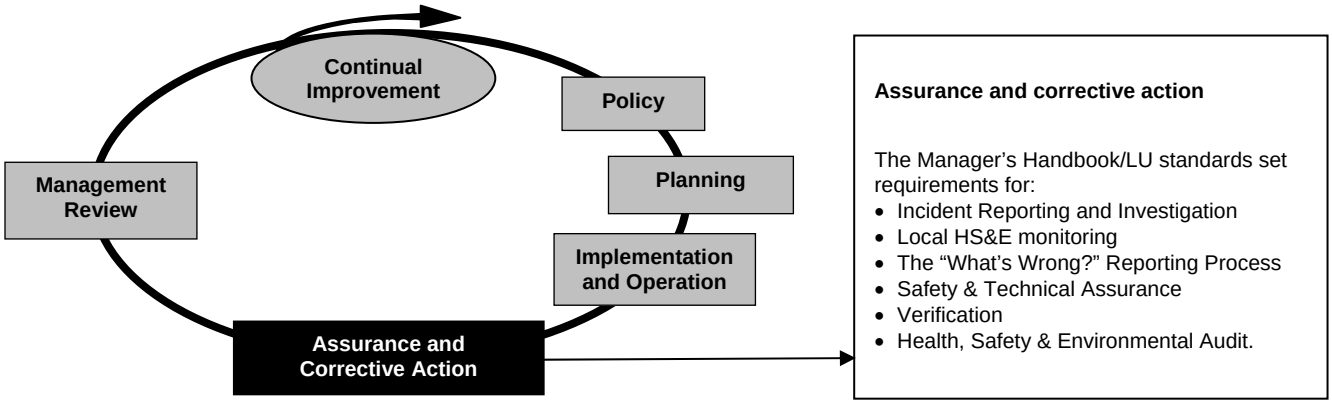

Figure 2.12 Assurance and corrective action

Measuring performance occurs at all levels of management control, from Board reviews of performance against safety objectives to operational management monitoring of specific workplace precautions. While all members of the LU Group are accountable for measuring their performance in accordance with LU's Assurance Regime (Section 13.7) as Infrastructure Manager, LU retains accountability for the safety performance of the network. Although the LU Director of Health, Safety and Environment and the Head of Engineering are accountable for providing safety and technical assurance to the Board, performance measuring occurs across the LU Group and at various managerial levels.

Where areas for improvement are identified (as described in Sections 6.5-6.8), actions and improvement targets are set and monitored through The Plan or local action plans. Significant safety improvement actions are monitored by the Health, Safety, Environment and Climate Change Programme Board. Local improvement actions are monitored by local managers.

2.5.5 Management Review

This element of the Management System reviews the health, safety and environmental aspects of the Management System to ensure its continuing suitability, adequacy and effectiveness.

LU's review arrangements enable effective monitoring of the adequacy of health, safety and environmental management arrangements and allow decisions about the nature and timing of necessary actions to remedy deficiencies and effect improvements. The highest level of review takes place at the Rail and Underground Board.

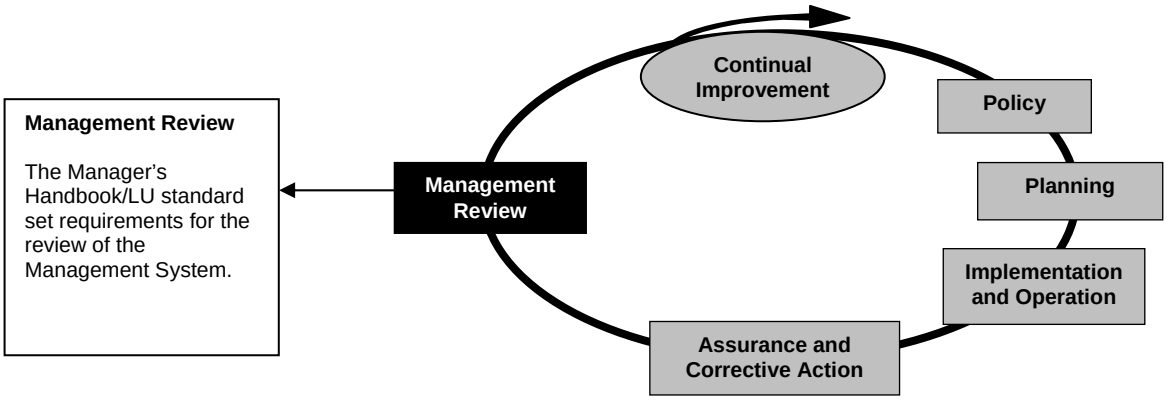

Figure 2.13 Management review

Through these arrangements for review of HSE management arrangements, LU ensures effective review of compliance with, and continued effectiveness of the health, safety and environmental management system, identifying improvement actions where appropriate.

2.6 Consultation with employees

This section describes arrangements for consulting with employees on health and safety matters. LU has established a consultation process, the objective of which is to ensure that employees' views (via their representatives) on existing health and safety issues are properly considered, particularly regarding proposed changes that could affect their health and safety in the workplace. The consultation process also provides an important feedback channel between employees and managers on health, safety and welfare matters enabling:

- managers and employees to understand their legal responsibilities
- constructive liaison between managers and Trade Union Health and Safety (H&S) Representatives
- feedback to be provided to Trade Union Health and Safety Representatives
- the improvement of risk control systems.

LU recognises that the success of arrangements for consulting with employees on health and safety matters has the potential to provide significant benefit to HSE management arrangements. Such potential benefits include:

- managers receiving a 'front line' viewpoint before implementing changes,
- Trade Union Health and Safety Representatives made aware of forthcoming issues in sufficient time to enable them to obtain the view of employees they represent,
- better relationships are formed between managers and Trade Union Health and Safety Representatives, and
- enhancing the potential for continuous improvement in health and safety performance.

Staff are encouraged to make observations on local or wider health and safety issues to their managers. Suggestions or observations can be made through a variety of formal and informal means, e.g. informal one-to-one discussions, Performance and Development meetings, team meetings, local health and safety meetings, open letters in the company magazine, the "What's wrong?" form, etc. Staff are also encouraged to make suggestions for improving the Management System documentation and information about this process is available on the intranet.

2.6.1 Arrangements for consultation

Health and Safety Representatives are elected to represent their members on health and safety matters and to communicate and consult with the members they represent. They may also represent non-union members who they have agreed to be Health and Safety Representatives for. This enables LU to satisfy the requirements of the relevant statutory provisions.

The means by which LU engages with its employee Health and Safety Representatives is set out in the Manager's Handbook, Category 1 and 5 HSEMS standards. Details are set out in LU's Health and Safety Consultative Framework (available on the intranet).

2.6.2 Manager's Handbook and HSEMS standards

The Manager's Handbook and the suite of HSEMS standards, developed in conjunction with employee Health and Safety Representatives, set requirements for employee involvement in key health and safety related activities. These include:

- the management of change
- risk assessment
- incident investigation
- monitoring and audit
- the development of applications for Safety Certification and Safety Authorisation.

Compliance with the requirements of these standards ensures that Health and Safety Representatives are involved in good time in respect of those matters relevant to employee health and safety.

2.6.3 Health and safety consultative framework

In addition to the involvement of LU's Health and Safety Representatives in these day to day consultation activities, LU, working with the trades unions, has also established a consultation framework that operates on a tier basis, as outlined below, to enable regular consultation to take place at a local level, functional level and company level. This has been structured in such a way as to allow trains, stations and other areas' health and safety issues and concerns to be considered in the most appropriate way.

2.6.3.1 LU Health and Safety Forum

The LU Forum is chaired by the LU Director of Health, Safety and Environment and attended by LU senior management representatives and Trades Union head office representatives from the RMT, TSSA, ASLEF and Unite Trades Unions. The forum

meets at least four times a year and items for discussion include significant health and safety related changes, LU health and safety performance and major incidents and investigations affecting LU employees.

Where matters at Forum level have implications for LU and Tube Lines, a Joint Health and Safety Forum is established.

2.6.3.2 Health and Safety council meetings

There are separate Health and Safety Council meetings for Stations and Revenue, Trains, Service Control, Managers, Track and Signals, Fleet, Stations and Structural Maintenance, and Operational Managers, Support Managers and Administration. These meetings are normally chaired by a nominated General Manager and attended by other relevant LU management representatives, including HSE, and the employee Health and Safety Representatives who have been appointed to the relevant Safety Council.

The Councils meet at least quarterly and cover topics such as significant functional health and safety issues or changes, functional health and safety performance, safety audit programmes and the results of safety audits and the effectiveness of consultation within the functional area.

2.6.3.3 Local Committees

Each local manager will chair their own local committee in the following areas: Trains, Stations, Revenue Control, Track and Signals, Fleet and Stations & Structural Maintenance. Also in attendance are other relevant operational managers, a representative from HSE and the health and safety representatives appointed to the Local Committee. The Local Committees meet quarterly and discuss topics such as local health, safety and environmental management systems implementation, local risk assessments and action plans and local incidents.

2.6.3.4 Ad Hoc Committee meetings

In addition to programmed local and safety council meetings, ad hoc meetings may be requested by LU management or employee Health and Safety Representatives where significant issues arise or are identified.

2.7 Monitoring health, safety and environmental performance

LU's requirements for monitoring performance have been established via LU's Category 1 HSEMS Standard: Monitoring Health, Safety and Environmental Performance. This standard, which applies to LU and its suppliers, covers:

- the requirement to monitor and analyse health, safety and environmental performance as a means of providing assurance that HSEMS is adequate and effective
- the competence of those involved in monitoring activities
- the need for monitoring to be based on risk and take into consideration the results of risk assessments and the LU Quantified Risk Assessment

- the monitoring framework covering what is monitored, who undertakes monitoring, monitoring methods etc.
- matters/inputs to be considered in formulating monitoring arrangements
- determining priorities when developing improvement actions as the result of monitoring activities.

2.7.1 Safety Key Performance Indicators

LU monitors health safety and environmental performance through a number of Safety Key Performance Indicators (SKPIs). These are defined in LU's Category 1 HSEMS Standard: Monitoring Health, Safety and Environmental Performance which requires:

- SKPIs to be developed
- the criteria that a SKPI must meet to be valid
- reporting requirements and timescales
- visibility and accuracy of underpinning data
- LU's right to establish new SKPIs
- trend analysis and target setting
- communication of data/analyses to others affected by LU's operations such as other operators or health and safety representatives
- developing remedial actions to address adverse trends
- regular reporting to senior management
- RIDDOR (Reporting of Injuries, Diseases and Dangerous Occurrences Regulations) reporting.

LU's main SKPIs have been developed progressively and have been subject to controlled change over time to ensure that they reflect a continually improving understanding of risks.

In addition to these measures, LU reviews and develops new measures as required. The dominant risk precursor sequences with the potential to result in a major accident have been derived from the LU Quantified Risk Assessment models (further detail in Section 4). These have been mapped against existing data reporting streams. Much of this data reflects LU maintenance and Tube Lines' contribution to the overall risk profile through the management of asset condition and performance. This allows better monitoring of statistical trends in key risk precursor sequences where quantitative data already exists to complement asset performance reviews, and to determine future needs for establishing further data streams.

LU HSE works with COO, APD and CPD to establish particular precursor events which are the subject of monitoring. Suppliers also report their performance to LU on a regular basis. LU's main SKPIs are:

- customer accidental fatalities*
- customer major injuries*
- employee and contractor fatalities
- employee major injuries
- signals passed at danger (SPADs)
- confirmed fires*
- number of regulator enforcement notices received*

- employee lost time injuries
- workplace and work related violence*
- incorrect train door opening*
- person and train incidents*

** These are reported on by LU only.*

Precursor measures include:

- near hits
- serious rail defects
- brake faults
- broken fishplates
- parts detached from trains
- technical SPADs
- wrong side signal failures
- door failures
- earth faults
- unacceptable clearance/gauging applications
- proportion of staff trained
- on train data messages
- missing components

In addition to SKPIs and precursor measures, measures to actively monitor the effectiveness of HSE management arrangements are in place. These complement the traditional output based measures by looking at how LU and suppliers perform in delivering against safety commitments. Measures include:

- safety improvement action progress as measured by the Health, Safety, Environment and Climate Change Programme Board
- incidents of LU fault reporting and performance in clearing faults
- progress in completing formal investigations
- audit programmes and audit trends
- safety related training against programme
- asset precursor indicators.

LU uses leading indicators to measure the effectiveness of control mechanisms. These indicators are based on elements of the Management System, performance reviews, risk reviews, outcomes of risk assessments, etc. They are regularly reviewed to ensure they are appropriate for LU's needs. Examples include:

- Risk-based audits
- Planned General Inspections undertaken
- Senior Manager Safety Tours
- Delivery of safety hours or safety briefings
- Safety culture measurements
- Precursors to incidents

Safety related data on asset condition and performance is also collected and analysed. This is undertaken via LU maintenance performance review meetings and Asset

Performance Review Meetings attended by LU Professional Heads and Tube Lines Asset Engineers.

LU will continue to review and develop measures of safety performance in line with the best safety management practice. However, this is from a base of an existing diverse range of measures that provide a benchmark of performance for future monitoring of safety performance.

2.7.2 Health, safety and environmental performance reporting

The Head of HSE Operations and Asset Performance is responsible for ensuring that safety performance and incident data from LU, Tube Lines, PFI and other suppliers is collected, analysed, reported in accordance with the LU standard. Safety performance analysis is provided to the Network Services Director and Line General Managers by HSE each period. These reports are reviewed by the operational management teams at three levels:

- Network Service Director management meeting
- Line General Managers meetings
- Trains and Stations Performance Managers meetings.

Safety performance information is also provided to Trades Union Health and Safety Representatives in accordance with the LU standard.

LU produces a quarterly company HSE Performance Report. This is reviewed by the LU Health, Safety, Environment and Climate Change Programme Board. This contains an analysis of LU's HSE performance. The Chief Operating Officer, Capital Programmes Director and Asset Performance Director all report on the safety performance of their directorate. The quarterly HSE report also includes information on the HSE performance of LU's suppliers. LU supplier data is obtained both from the supplier's own assessment of their performance which they provide to us in their safety performance reports and also directly by LU from its own sources. The LU quarterly HSE Performance Report is issued internally, and to Tube Lines for use in its HSE performance management reviews.

LU also includes a comprehensive summary of safety and environment performance and improvement in progress in the annual TfL Health, Safety and Environment report. This is available to the public via the TfL web site.

2.7.3 Local HSE Monitoring

The requirements for monitoring activities applicable to LU, Tube Lines and other suppliers, are detailed in LU's Category 1 HSEMS Standard: Monitoring Health, Safety and Environmental Performance. This includes requirements for developing and implementing health, safety and environmental monitoring regimes and performance indicators in order to identify and analyse performance. The implementation of this standard within LU is achieved in the relevant elements of the Manager's Handbook, e.g.:

- Senior Management Tours and visits
- Health, Safety and Environmental Management System Checks

- Planned General Inspections
- What's Wrong Reporting

These monitoring processes are based on the principle of local management regularly checking assets and systems, identifying deficiencies and correcting them. This enables local management to establish through the levels of compliance with requirements in their individual areas.

Monitoring activity is arranged in a hierarchical manner to ensure that each level provides assurance that the checks below it are effective. The monitoring regime promotes management visibility and involves all levels of management in a coordinated manner. This ensures that local managers are accountable for actions identified, and responsible for implementing corrective action/improvements where necessary. The monitoring activities undertaken by local managers within LU (as above) are detailed below.

Where a breach of procedures or rules is identified, appropriate action is taken. This may include coaching, further training, disciplinary action, etc. (as described in Section 8.4) or a review of standards/rules as appropriate.

2.7.4 Senior Management tours/visits

Senior Management tours/visits are carried out by Directors and Senior Managers in the locations for which they are responsible. Health, safety and environmental matters are integrated within the tours/visits to ensure good practice and areas for improvement are identified.

These are risk based, programmed and designed to show a visible commitment from directors and senior managers to health, safety and the environment and enables them to seek assurance that the arrangements for HSE management are understood and followed. They involve discussion with both employees and Health & Safety Representatives.

Any findings and required actions as a result of the tours and visits are recorded and communicated to management teams, health and safety representatives, employees and relevant Health, Safety and Environment Manager. All actions are allocated to specific managers with a clear deadline and are shared with local staff, Health & Safety representatives and the relevant HSE Manager. Action delivery is monitored locally to ensure completion.

2.7.5 Local checks of the management arrangements for HSE (HSEMS Systems Checks)

HSEMS Systems Checks are conducted by Centurion Managers in the Chief Operating Officer's Directorate and are a systematic means by which managers seek assurance that the systems and procedures implemented for the control of health, safety and environmental risks are effective in their areas of responsibility.

Checks are carried out to a programme based on the risks and current levels of compliance at each location. The scope of the checks reflect the locations' risks and associated controls and they are developed with reference to the requirements of

standards relevant to the activities undertaken, relevant incidents and any changes to the organisation or working practices. The methods of checking include:

- review of documentation
- observation of working practices
- discussions with staff and Health & Safety Representative
- physical inspection (as means of checking the effectiveness of the planned inspection and fault reporting/correction regime).

Following completion of the System Check, a report is produced identifying the results and any action to be taken. The findings are communicated as appropriate and actions tracked to completion via local management meetings, meetings with health and safety representatives, team meetings and higher management meetings where necessary.

2.7.6 Planned General Inspections

Planned General Inspections (PGIs) are carried out to a programme by Duty Managers and are systematic, risk based inspections of all LU operational workplaces such as stations, depots and track locations. Inspections consider physical conditions and the activities undertaken within such workplaces. The purpose of inspection is to identify any hazards, substandard conditions or substandard practices present. All findings are recorded and sub-standard practices are dealt with at the time of inspection. Any sub-standard conditions are notified to the relevant fault reporting centre or the employing manager is made aware of the need for action. These inspections also allow Duty Managers to assess the quality and effectiveness of the daily checks and inspections undertaken by Station Supervisors in LU stations.

The effectiveness of PGIs is monitored via the local management checks outlined above and PGI programmes are reviewed on a regular basis to ensure relevance to locations.

2.7.7 Station Supervisor checks

Station inspections are carried out by Station Supervisors, on at least a daily basis, to ensure that station premises are in good condition and equipment is operating satisfactorily. Checks at this level are aimed at ensuring safe operation throughout the working day, either in accordance with internal requirements, as a result of legislation or at the request of outside agencies, e.g. security checks. Inspections are recorded in the station logbook and any defects and maintenance items needing attention notified to the relevant Fault Reporting Centre. These are dealt with on a priority basis with matters having an effect on health and safety allocated special clearance times.

The effectiveness of monitoring at operational level is reviewed as part of station operations audits described elsewhere in this section. At overall management systems level, the effectiveness of monitoring/local assurance arrangements, including independence, are covered within the scope of the Management System and the safety authorisation/safety certificate audits.

2.7.8 What's Wrong? reporting

'What's Wrong?' is LU's alternative reporting arrangements for health, safety and environmental matters. Matters of concern with regard to health, safety and the environment are notified to the relevant local manager in the first instance. However, if the outcome of this approach is considered to be unsatisfactory, employees can report concerns via the 'What's wrong?' process. Issues raised using this process can help to identify any areas of concern in the work location and are reflected in monitoring activity carried out at the location.

The 'What's wrong?' process is promoted in the workplace at each location, staff are made aware of its existence and are supported by managers should issues be raised via this method. Where 'What's wrong?' forms are used, issues are investigated and resolved immediately or monitored until completion, with the member of staff raising the issue kept informed of progress. The effectiveness of the 'What's wrong?' process at individual locations is monitored via Health, Safety and Environmental Management System Checks or audit.

2.7.9 Monitoring significant HSE actions

The progress of the more significant health, safety and environment improvement actions across LU is monitored via 'The Plan'. 'The Plan' is an annual plan which set out LU's major programmes and milestones for the financial year ahead. New milestones, e.g. from Formal Investigation Reports, can be added via a change control process throughout the year. Milestone delivery is monitored by the Rail and Underground Board each period. Significant health, safety and environment actions are included in a specific work programme: the Health, Safety, Environment & Climate Change work programme. Delivery of this programme is monitored by the Health, Safety, Environment & Climate Change Programme Board (HSECC). Other significant actions, e.g. the recommendations from LU Formal Investigation Reports, are also monitored through 'The Plan'. The Head of HSE Operations and Asset Performance has overall accountability for the Health, Safety, Environment & Climate Change work programme.

Actions in the HSECC programme must follow the prescribed format: clear actions, accountable managers allocated, realistic time scales and, where appropriate for longer term actions, clear milestone information. Progress is tracked against such information and each action has a red (delayed), amber (threat of delay) or green (on programme) designation. This allows local and company level monitoring and control of progress on safety improvement actions and facilitates prompt remedial action where this is considered necessary. The GM HSE Operations and Asset Performance prepares a range of reports for management consideration at Programme Board and the Rail and Underground Board.

2.7.10 Confidential Reporting

LU subscribes to an external railway industry confidential and anonymous reporting system (Confidential Incident Reporting and Analysis System – CIRAS). This allows employees to raise concerns in strict confidence. Managers must ensure that all employees are aware of CIRAS. On receipt of reports from the confidential reporting agency, LU investigates the issue, provides a response and takes action as necessary.

TfL also has a confidential reporting system, SafeLine. This confidential and independent reporting service is available for all staff to raise concerns. Employing managers must ensure that employees are aware of this system. On receipt of reports, LU investigates the issue, provides a response and takes action as necessary.

2.8 Revision history of this section

Revision Number	Date	Changes
V2 (as Version 2.00)	October 2011	Five year renewal of LU's Safety Certificate and Safety Authorisation

Annex 2A: LU Health, Safety and Environment Policy

Health, Safety & Environment Policy

The TfL Board, Commissioner and Managing Directors are committed to having health, safety and environmental (HSE) performance that we can be proud of.

By implementing this policy through HSE management systems, we shall:

Plan improvements in HSE management by:

- Complying with the spirit and the letter of HSE legislation, Approved Codes of Practice, internal HSE management systems and external HSE standards.
- Ensuring the risks to the health and safety of employees, customers, contractors and 3rd parties are systematically managed to as low as is reasonably practicable.
- Setting progressive objectives and targets to improve HSE management and performance in keeping with stakeholder expectations and Mayoral strategies.
- Taking due account of HSE risks and benefits in decision-making and as an integral part of the business planning process including procurement and major projects.
- Striving to realise environmental benefits, in addition to pollution prevention, with a focus on managing emissions and mitigating the effects of, and adapting to climate change.
- Actively supporting the Mayor in delivering the environmental strategies on air quality, ambient noise, biodiversity, energy and municipal waste.

Implement and operate effective risk control systems by:

- Ensuring employees have the competence and resources to discharge their personal responsibilities for HSE matters and encouraging a positive HSE culture.
- Providing employees with access to services to promote health and wellbeing.
- Providing premises, plant and equipment and systems of work that contribute to a safe and healthy work place and minimise harm to the environment.
- Securing the commitment and involvement of our employees in improving HSE management through effective communication and consultation mechanisms.
- Ensuring arrangements with contractors promote and actively support the implementation of this policy.
- Planning for foreseeable emergency conditions to ensure effective risk controls and resilience arrangement are in place.

Monitor HSE performance, taking corrective action where required by:

- Monitoring HSE management system indicators to improve performance.
- Ensuring that root causes are identified in the investigation of incidents.
- Effective auditing arrangements are in place to provide assurance and to identify and ensure appropriate corrective action where required.

Undertake regular management reviews:

- Regularly review the suitability and effectiveness of HSE management, including this policy, and undertake improvement action where appropriate.

This policy shall be communicated to all employees and be publicly available.

Mike Brown, Managing Director London Underground

LU Owner: HSQE
Policy No: 1-01102-001
MAYOR OF LONDON

Effective Date January 2007; Amended: January 2010
LU Custodian: SQE Manager (Standards)
Issue No: A3

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Section 3: Legislative requirements and legal compliance

Contents

3.1 Management of legislative requirements

As required by the Manager's Handbook: Providing the Management System, the HSE Directorate maintains a Statutory Instruments Register – a register of all applicable health, safety, environmental and asset-related legislation on behalf of LU. The Register contains two broad headings, Acts and Regulations, under which is listed the relevant Acts and Regulations. These cover statutory provisions in respect of

- health and safety
- environment
- assets

The Register provides a synopsis of the general requirements of each Act or Regulation, a commentary on the relevance to LU and a designation in respect of whether the legislation has health and safety, environmental or asset implications. Where appropriate, regulatory requirements have been incorporated into the relevant element of LU's Management System, including the functionally-based standards (Table 5.1). The Statutory Instruments Register is available to all employees through the intranet.

LU subscribes to a recognised technical index which employees can access via the LU intranet site. To prepare for forthcoming legislation, a nominated manager within HSE regularly monitors a number of key web sites for consultation documents/new legislation. LU participates in the shaping of legislation by analysing the implications of proposed legislation and ensuring that any specific concerns are fed back to those proposing the legislation. This analysis is also presented to key decision makers within LU who ensure that suitable programmes are put in place to ensure compliance in the required timescale.

Asset engineers and a dedicated role in the HSE directorate are required, through the Manager's Handbook: Providing legal, governance and audit support, to review and provide updates on relevant legislation to the HSE Safety Certificate Manager. Where required, changes to documents in the Management System are made to ensure compliance.

3.2 Ensuring legal compliance

Through the LU Management System, legislative requirements that need to be translated into an LU document are captured and a new or amended document is developed via the change control process. Compliance with the legal requirements, through LU's Management System, is monitored as described in Section 2.4.4 (for LU requirements) and 2.4.6 (for Railway Group Standards).

Section 11 describes the arrangements that LU has established for safety and technical audit. This is an important means of measuring compliance with legislation and identifying any corrective actions that may be required.

3.3 Revision history of this section

Revision Number	Date	Changes
V2 (as Version 2.00)	October 2011	Five year renewal of LU's Safety Certificate and Safety Authorisation

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Section 4: Controlling Risk

Contents

4.1 Introduction to Risk Assessment

The arrangements described below ensure that LU carries out a suitable and sufficient assessment of the risks posed by hazards arising from LU operations, in light of the controls in place. These sections:

- explain strategies and methodologies for carrying out risk assessments
- identify responsibilities for risk assessment
- explain how LU interfaces with other members of the LU Group and other railway operators when carrying out risk assessments
- describe the arrangements for the review of risks and risk assessment.

Mapping and recording hazards and controls as part of the risk assessment processes provides a structured framework for:

- understanding the nature of the current risk on the LU network
- identifying areas needing in-depth risk analysis (topic-specific risk assessments)
- assessing the suitability of risk control arrangements
- assessing the safety significance of proposed changes to the railway
- helping to determine safety objectives, targets and measures.

4.2 Safety decision making and ALARP

System risk is the totality of all safety risks to customers, employees, suppliers, other railway operators and other affected parties, that arise due to LU operations. It comprises:

- risks arising from LU's actions or failures
- risks imported by customers and other third parties e.g. suppliers and other operators that LU interfaces with
- risks that LU exports to others e.g. other operators that LU interfaces with.

LU has a duty to ensure the risks arising from its operations are as low as reasonably practicable (ALARP). This requires LU to look for ways to improve safety and to make judgements on whether it is worthwhile to make these improvements. In doing this, LU considers the existing level of risk, the risk reduction that the improvement would give, and the cost and difficulty of making that improvement.

The approach LU adopts to justifying safety decisions such that its risks are ALARP is outlined in the Category 1 HSEMS Standard: Safety Decision Making. This standard specifies that the starting position of any ALARP decision is one of best practice. Applying best practice should generally be considered to adequately demonstrate that risks are being controlled at a level that is ALARP. In determining best practice, LU considers the safest option that is in use in the industry or an equivalent industry, Industry and Regulatory Codes (such as Approved Codes of Practice and Regulatory Guides).

Where best practice is unachievable, LU undertakes a qualitative analysis of the safety implications supported by a quantitative analysis as appropriate. A qualitative analysis includes:

- the safety significance of any shortfalls against recognised safety principles, standards, codes of practice etc. It takes into account any special circumstances e.g. susceptibility to failure or additional control measures which may be present. This allows existing risks and the risk reduction potential of the improvement option to be evaluated
- susceptibility to human and/or organisational failures and the adequacy of degraded operations
- the practicality of the option to achieve the improvement potential (e.g. new build versus refurbishment etc.)
- the possibility of increased accident potential during implementation.

A qualitative judgement is made as to whether the option is reasonably practicable. Where major costs are involved or the issue has high safety significance, where it is practicable to do so, LU supports the qualitative assessment with a quantitative assessment.

4.3 Tolerability of risk

Figure 4.1 outlines the framework applied by LU to assess the tolerability of risk. LU carries out a qualitative analysis, supported by a quantitative estimate, of the risk to those individuals considered most at risk within the group being assessed.

If this quantification indicates that, for an individual, the risk of fatality exceeds 1 in 1,000 per year for employees and suppliers, or 1 in 10,000 per year for a member of the public, then the risk is regarded as intolerable. Under such circumstances, LU would take immediate action to reduce the risk to below these levels, including if necessary suspending the activity giving rise to the risk.

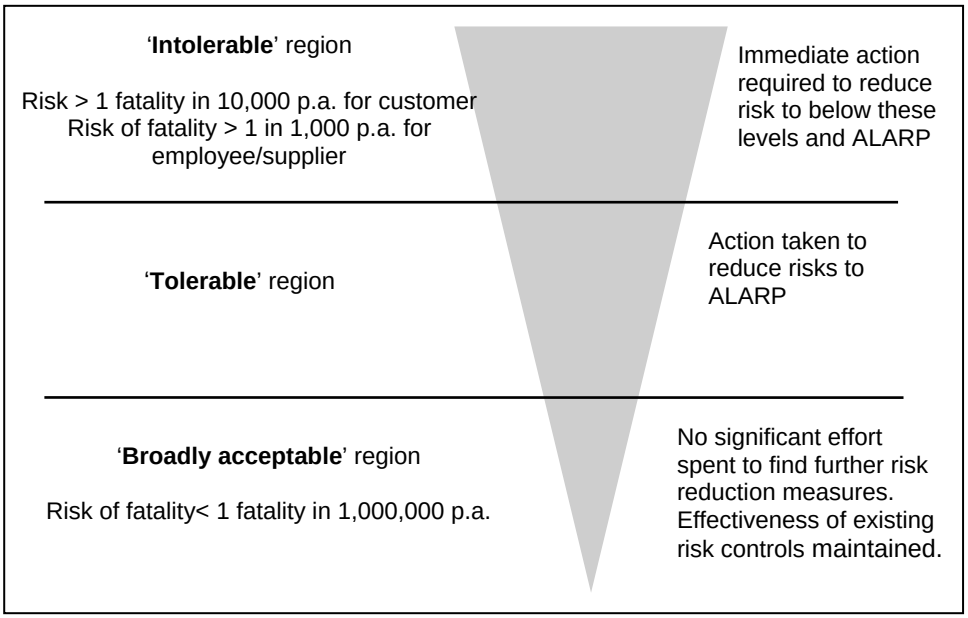

Figure 4.1 Tolerability of Risk

If this quantification indicates that, for an individual, the risk of fatality is below 1 in 1,000,000 per year, the level of risk is regarded as broadly acceptable. At this level LU would not expend any significant effort to find further risk reduction measures, but would focus on ensuring the continuing effectiveness of existing risk control measures.

4.4 Risk assessment

4.4.1 Overview of risk assessment methods

LU and its suppliers are responsible for undertaking risk assessments for their activities that affect the railway in accordance with the Category 1 HSEMS Standard: Assessment and Management of Health, Safety and Environmental Risk. This includes a requirement to consult and co-operate with other organisations that may be affected.

Different situations require different risk assessment techniques. To reflect this, LU has developed a variety of risk assessment tools, these are:

- LU Quantified Risk Assessment (LU QRA)
- Customer Risk Assessment (CRA)
- Workplace Risk Assessment (WRA).

Risk rating systems have been developed for these risk assessment methodologies.

Particular requirements have been specified in health and safety legislation for certain issues, e.g. noise. These risks are assessed using LU standards and UK Health and Safety Executive (HSE) / Office of Rail Regulation (ORR) Guidance and Codes of Practice to ensure that best practice is employed. LU's Category 5 HSEMS Standard: Health, Safety and Environmental Risk Assessment exists to ensure compliance with statutory requirements for Workplace Risk Assessments, Noise, Vibration, Manual Handling, Lead, Display Screen Equipment and Asbestos. This new Category 5 standard was introduced, via the change control process in The Plan (LU's major change programme described in Section 6.3), in May 2011. It brought all workplace and topic specific related risk assessments together into a single framework to make the risk assessment process more co-ordinated across LU.

4.4.2 Overview of LU Quantified Risk Assessment models

Quantitative risk assessment methodology is used to assess the risk of major hazards with the potential to cause fatality to customers and other members of the public. This includes risks imported to LU's operations through the activities of other LU suppliers, other train operating companies, other station operating companies and Network Rail. It also includes the risks to LU customers when LU operates over Network Rail managed infrastructure. This method produces the LU QRA Model which sets out LU's safety risk profile. Although its prime purpose is to derive risk of fatality to LU customers and other members of the public, the LU QRA may also be used to derive the risks to employees from major hazards, e.g. the risk of fatality to a train operator in the event of a head-on collision between trains, a train fire or a derailment. It can also be used to determine the risk of fatality to station staff for example in the event of a station fire.

The LU QRA determines the expected aggregate statistical fatalities per year resulting from LU operations. This is achieved by evaluating the risk of fatality to LU customers

and other members of the public from major hazards on each LU line separately. It then sums these to determine the total risk arising from LU operations. The major hazards are grouped into those that result in similar outcomes. Each of these outcomes is referred to as a 'Top Event'. The risk associated with each Top Event is represented graphically in the QRA risk profile. The QRA risk profile allows LU to easily determine the dominant Top Events.

The Top Events cover all risks of fatality to LU customers and members of the public. This includes risks which could affect an individual or low frequency, high consequence events which could potentially result in multiple fatalities. Examples of the Top Events include:

- Customer being hit by train while on the platform
- Customer trespass on the track
- Customer falls on stairs
- Unauthorised use of train inter-car doors by a customer
- Flooding from the River Thames, burst water mains or sewers
- Customer assaults on trains or in stations
- Collision between trains, including between LU customer trains, between LU customer trains and other trains on Network Rail infrastructure and collision between customer trains and engineering trains.
- Structural failure, e.g. bridge collapse
- Fires in stations, trains and tunnels

In assessing the risk associated with each Top Event, there may be many failure paths which could lead to major hazards and the consequences may vary depending on factors such as the number of people involved and the success or failure of safeguards and mitigating measures. The LU QRA utilises Fault Tree and Event Tree Analysis to model the risks associated with these hazards. This technique is suitable for modelling complex combinations of events, which individually may only occur infrequently and which may have differing outcomes depending on the success or failure of the control systems in place.

Fault Tree Analysis estimates the frequency of a combination of events leading to a major hazard. The annual probability of these events is quantified by using incident data or qualitative judgement where data is unavailable. When human failure is involved, human error probabilities are predicted by human factor assessments.

Event Tree Analysis maps how events can escalate, including the failure of control and mitigation measures. Fatality estimates are determined through incident data analysis, expert judgement and consequence analysis.

4.4.3 LU QRA Model risk rating system

Within the LU QRA, the relative significance of risk from each Top Event for a particular line is classified as high, medium or low as follows:

- High: when the risk is greater than 1 statistical fatality per year;
- Medium: when the risk is between 0.001 and 1 statistical fatality per year
- Low: when the risk is less than 0.001 statistical fatality per year.

The relative significance of the risks assessed by the LU QRA is also classified at a corporate level by the GM HSE Operations and Asset Performance to identify the relative significance of risks and priority areas across the LU network. The GM HSE Operations and Asset Performance is responsible for the maintenance and development of the LU QRA. For this classification, the significance of each Top Event is considered:

- High: if it represents over 50% of the risk profile and is therefore the dominant contributor
- Medium: if it represents between 10% and 50% of the risk profile and is therefore a significant contributor
- Low: if it represents under 10% of the risk profile and is therefore a small contributor.

4.4.4 Maintenance and review of the LU QRA models

The Top Event risks that are currently reflected in the LU QRA have evolved from initial work carried out in 1988 to identify the major hazards that had the potential to affect the LU network. This initial work was undertaken in the form of a hazard identification exercise facilitated by external risk assessment experts and involving competent resources from the operational, engineering and safety directorates of LU. This initial hazard analysis took into consideration physical asset failure data, incident/event data, engineering judgment and human factors elements and focussed on all events that had the potential to lead to a fatality. In this way the initial list of LU Top Events was developed. This, in turn, led on to a more structured Fault Tree Analysis in 1989 with more fully developed consequence analysis following in 1990.

Since 1990, new failure and event data has progressively been incorporated in the QRA models as part of on-going review as described below. This has allowed the Top Events to be refined and adapted as knowledge and the extent/reliability of data has increased and improved.

The ongoing structured review and revision of the LU QRA ensures that LU is able to focus on risk prioritisation in terms of implementing appropriate risk controls and the identification of safety improvement opportunities that are taken forward via the LU and Tube Lines Safety Improvement Programmes as described in Section 6.5.

The HSE Directorate maintains a comprehensive archive that documents the initial hazard identification work through to the current versions of the LU QRA models. The directorate is responsible for the maintenance and development of the LU QRA. Through LU standards, other members of the LU Group are required to support the continual maintenance and development of the LU QRA. The Category 1 HSEMS Standard: Assessment and Management of Health, Safety and Environmental Risk, describes the arrangements which ensure that the LU QRA is reviewed and developed.

Each Top Event is reviewed and developed (as appropriate) to ensure it reflects an understanding of the events which could lead to this outcome. The publication of the revised understanding of risk is published either at the next update or immediately if the revision or development has had a significant impact on the overall LU Group safety risk profile. The LU QRA review work plan is reviewed annually and Top Events updated in line with this plan.

The review of the LU QRA includes a structured review of the Top Events for completeness, amendments to incorporate changes to the railway infrastructure and procedures and an update of failure data. The regular review of the LU QRA ensures any gaps in understanding of risks are identified and their precursors and controls are understood and incorporated into the LU QRA.

This is facilitated through structured hazard identification (HAZID) sessions with relevant operational personnel, Professional Heads and asset engineers, through incorporation of independent risk assessments, and through a review of incidents occurring on the LU network, the mainline railways or international railways. The release of updated LU QRA models is shared with the LU Health, Safety, Environment & Climate Change Programme Board.

LU's suppliers are required to provide qualified and experienced staff to assist with the provision of design, reliability, availability and maintenance data - including information derived from major projects, feasibility or business case studies. Where Tube Lines or other suppliers implement projects which affect the LU QRA, Tube Lines or the supplier is responsible for the development of that part of the LU QRA affected by the project. Tube Lines is under an obligation to inform LU of all such projects. LU is responsible for integration of any revision into the LU QRA.

To facilitate this, LU and Tube Lines participate in the quarterly Risk Assessment Forum. The Forum's key role is the establishment of programmes of work to review, update and develop the LU QRA. It also evaluates the findings of the LU QRA reviews, recommends areas for potential safety improvement and shares information which has the potential to enhance or provide greater insight into the major hazards which give rise to risks to customers and other members of the public.

4.4.5 Overview of Customer and Workplace Risk Assessments

The LU QRA Models are complemented by the Customer Risk Assessments (CRA).

Site-specific customer risk assessments systematically analyse customer routes to identify local hazards and risks to customers. This process identifies lower consequence hazards (non-fatality risks) not covered in the LU QRA and provides input on location-specific hazards which could affect the risk of fatality. Where the CRA identifies fatality risks or location-specific major hazards, these are put forward for incorporation into the LU QRA.

The Customer Risk Assessment process involves following a walk-through of a typical customer journey to identify the relative significance of risks to customers. This simulation involves following a customer's route from when they enter a station (from entrance to train boarding), to train travel, to when they leave a station (from alighting to exit). Any interchange points and the types of customers using a station are also considered. The process also determines whether any groups of customers are more at risk from the identified hazards e.g. mobility impaired persons.

Workplace Risk Assessments (WRA) identifies workplace risks to employees. WRAs identify hazard groups by analysing the activities carried out in the workplace. Each activity is reviewed to identify the foreseeable hazards associated with it. The activities include those activities associated with:

- train operations
- station operations
- service control operations
- revenue control activities
- maintenance of fleet and trains
- track and signals maintenance
- stations and structural maintenance
- capital programmes activities
- office work

WRAs also help identify where specific risk assessments are required in relation to specific hazards or activities e.g. noise, manual handling. In these instances, specialist advice may be sought from the relevant LU specialist adviser. The specialist adviser will give advice on aspects of risk assessments if required and, along with Occupational Health, advise if health surveillance is required to monitor the effectiveness of controls.

WRAs and CRAs are led by a competent assessor. Qualification as a risk assessor requires the completion of a recognised training course, including an examination, followed by the validation of a completed assessment. Competence requirements are set out in LU's Category 5 Standard: Health, Safety and Environmental Risk Assessment.

The WRA/CRA process applied ensures the involvement of personnel who are familiar with the location and activities being assessed. Consultation with local Trade Union Health and Safety Representatives is undertaken in respect of WRA.

The levels of risk are determined using the frequency of exposure and the likely severity of exposure in accordance with the risk rating matrix explained in Section 4.4.6. The CRA and WRA processes utilise a risk matrix approach where historical data and the experiences of people familiar with the situation being assessed are used to assign likelihood and consequence to pre-defined bands.

To ensure completeness and consistency within CRA and WRA, templates have been developed for some common activities that are undertaken in locations across the business, which identify hazards associated with a customer or staff activity and the controls available in the company to mitigate these hazards. These templates (which are available via the LU intranet on the WoCRA2 database) have been adjusted locally, by a competent lead assessor in conjunction with colleagues and Health and Safety representatives as appropriate, to reflect:

- additional hazards
- controls that do not apply or are ineffective at the location
- additional controls in place at the location
- appropriate ratings for likelihood and severity at the location.

The CRAs/WRAs include risks arising from the activities of other persons, e.g. malicious behaviour, verbal or physical assault, etc.

To facilitate the capture of assessments and monitoring of compliance with WRA and CRA arrangements, LU requires all assessments to be entered on a central repository, the WoCRA2 database. This database stores all current and archived risk assessments.

This approach to customer and workplace risk assessment allows LU to correctly identify and prioritise improvement actions locally and at a network level.

4.4.6 Risk rating systems for CRAs and WRAs

To determine the relative significance of risks, CRA and WRA use the risk rating matrix shown in Figure 4.2. The numerical scores for each severity and likelihood are added together to give an overall risk rating which enables the significance of each risk to be determined.

For this classification, the significance of each risk is considered:

- High: if it scores over 18 points
- Medium: if it scores between 15 and 18 points
- Low: if it scores less than 15 points.

High risks are reviewed as a priority to establish tolerability and to ensure immediate action to reduce risks to ALARP is taken. Medium or low risks are reviewed to determine whether there are any further reasonably practicable risk reduction measures that could reduce the risk.

		LIKELIHOOD							
		Less frequent than every 10 years **1**	Every 10 Years **5**	Every 3 Years **6**	Every Year **8**	Every 6 months 9	Every Month **10**	Every Week **12**	Every Day **13**
SEVERITY	Fatal **15**	**MEDIUM 16**	**HIGH 20**	**HIGH 21**	**HIGH 23**	**HIGH 24**	**HIGH 25**	**HIGH 27**	**HIGH 28**
	Severe **14**	**MEDIUM 15**	**HIGH 19**	**HIGH 20**	**HIGH 22**	**HIGH 23**	**HIGH 24**	**HIGH 26**	**HIGH 27**
	Major **11**	LOW 12	**MEDIUM 16**	**MEDIUM 17**	**HIGH 19**	**HIGH 20**	**HIGH 21**	**HIGH 23**	**HIGH 24**
	Moderate **8**	LOW 9	LOW 13	LOW 14	**MEDIUM 16**	**MEDIUM 17**	**MEDIUM 18**	**HIGH 20**	**HIGH 21**
	Minor **4**	LOW 5	LOW 9	LOW 10	LOW 12	LOW 13	LOW 14	**MEDIUM 16**	**MEDIUM 17**

Figure 4.2 Customer and Workplace Risk Assessment rating matrix

4.4.7 Maintenance and review of CRAs and WRAs

Employing managers are responsible for ensuring that risk assessments are carried out and that they remain valid. These managers are responsible for resourcing suitable and sufficient risk assessments for the operation of their function and ensuring that they are entered on the WoCRA2 database. The LU Director of Health, Safety and Environment is accountable for maintenance and improvement of the risk assessment processes, via the HSE SQEM Environment and Specialist Advisers and providing support in terms of specialist risk assessors, advisers and reviewers.

To ensure risk assessments remain valid, LU assesses changes to activities for their potential impact upon WRA and CRA. These changes are typically as a result of operational changes, changes to infrastructure or following an incident that has revealed

previously unthought-of risks. The arrangements for the management of change, including the assurance and change control processes, are described in Section 7.

Employing managers are responsible for ensuring all risk assessments are reviewed in light of such changes, or at least every three years, even if unaffected by specific changes as described above. The WoCRA2 database is used to monitor WRAs and CRAs to ensure that timely reviews take place. This is also monitored through audit activities.

4.4.8 Assessing fire risk

While LU's risk assessment framework incorporates some aspects of the assessment of fire risk (LU Category 1 standard: Health, Safety and Environmental Risk Assessment), LU also sets specific requirements for assessing and managing fire risk as set out below.

In line with the Regulatory Reform (Fire Safety) Order 2005, LU is required to demonstrate how compliance is achieved with the risk assessment provisions. The LU approach to this demonstration is based on a number of factors both at a LU network/generic level and an individual station level.

Whilst there can be significant differences in the nature of individual stations and it is necessary for such differences to be reflected in the preventive and protective measures adopted, all stations are subject to the generic LU control framework which, in itself, varies in accordance with the nature of individual locations. The relevant control frameworks are set out in legislation and supplemented by LU standards, where necessary, which mandates compliance by staff and suppliers.

Requirements for maintaining fire compliance documentation are set out in the Manager's Handbook. The key standards which support the Manager's Handbook are set out in Table 4.1. Compliance with the LU standards regime is described in Section 2.4.

Engineering	Operations	Health & Safety	Other
Fire safety principles	Station management	Risk assessment	Station planning
Fire safety performance of materials	Emergency evacuation plans	Management of change	Smoking ban
Fire safety of specific items and materials	Station staffing	Monitoring	General maintenance and testing of equipment
Design and installation of fire protection systems & compartmentation	Storage of materials	Assurance	Route signage
Active fire protection systems and portable fire equipment	Incident management	Audit	Communications equipment
Passive fire protection systems	Fire training of staff	Managing suppliers and contractors	Security management
Maintenance of fire protection systems & compartmentation	Emergency equipment	QUENSH contract conditions	CCTV systems
	Station fire plans		Emergency lighting
	Station inspections		Fault management
	Permit to work systems		Cleaning standards
	Control of hot work		Competence assurance

Table 4.1 LU network/generic fire safety controls

These standards put in place a generic fire risk control framework which ensures that:

- ignition sources are kept to a reasonable minimum
- combustibles are tightly managed in sub-surface stations and as far as is reasonably practical across the network
- materials used in construction are tightly controlled
- the nature of operations at each location and physical characteristics are well understood
- emergency preparedness is good and effective
- appropriate fire suppression, detection and containment is implemented and maintained
- the level of resources is appropriate and staff are competent
- the effectiveness of the physical and management arrangements are the subject of the LU assurance regime that includes inspection, management system checks and audit.

At an individual station level, LU has implemented:

- Congestion Control and Emergency Plans (as described in Section 10.1) at all stations
- Fire (Compliance) Plans for sub-surface stations
- Workplace and Customer Risk Assessments at all stations (as described in Sections 4.4.5 – 4.4.7).

Each sub-surface station has a set of station Fire (Compliance) Plans which have been developed in accordance with LU standards and procedures. The plans identify key fire protective measures including information on layout that may be of use to the London Fire Brigade in the case of a fire.

The more significant areas in respect of fire risk are represented explicitly in the station Fire (Compliance) Plan. These are the main areas where customers, employees and contractors are likely to be located. Particular consideration is given to the following areas which are considered to be the main areas where there are ignition sources and combustible materials:

- rooms containing electrical equipment and machinery
- storage areas
- staff accommodation and mess rooms.

These, and other rooms, are recorded and referenced on the station Fire (Compliance) Plan. The most likely sources of ignition, fuel and oxygen have been identified in Table 4.2.

The generic control framework provides the fire risk controls in respect of the above. In the event that there is a control failure and a fire occurs, physical control measures are in place to provide detection, suppression, and containment in order to facilitate safe means of escape for customers, staff and contractors.

Ignition Sources	Fuel Sources	Oxygen Sources
Deliberate act Station electrical equipment – operational assets/equipment Station electrical equipment – domestic/mess rooms Contractor activity Mechanical equipment – failure of rotating parts	Oil and grease in machine rooms Oil and grease on track Rolling Stock components Stored waste paper Waste paper on track/in tunnel Office supplies Contractors/cleaners materials Electrical equipment, e.g.. monitors	Air Forced ventilation caused by movement of trains

Table 4.2 Potential sources of ignition, fuel and oxygen

The measures implemented in each part of the station are recorded on the Station Fire Plan including:

- 1 hour and ½ hr compartmentation/fire separation
- fire detection system and call points
- fire suppression
- fire fighting equipment (hose reels and portable extinguishers)
- protected escape routes.

In the event that changes at the station are required, LU standards require the assessment of the risk arising from the change and the implementation of appropriate control measures (as described in Section 7). The fire impacts of changes to station layout (including temporary changes) are assessed and Congestion Control and Emergency Plans and Fire Compliance Plans are kept up to date.

4.4.9 Materials management

The Materials and Stores Manager's Handbook sets out requirements for materials management in the Asset Performance Directorate. This covers purchase, labelling, stock management, warranty, obsolescence and transportation. It also sets out requirements for appropriate risk management. Risks associated with the introduction of new materials are assessed in line with the change management process outlined in Section 7.

Fire risks, including use of appropriate materials, are managed through the standards set out in Section 4.4.8. Workplace risks, including Control of Substances Hazardous to Health (COSHH) assessments, are managed through the standard set out in Sections 4.4.5 and 4.4.7.

4.4.10 Risk assessment for interfaces with other railway operators

The Chief Operating Officer operates Bakerloo line and District line passenger service trains over Network Rail infrastructure. LU operations also interface with Network Rail and other Train Operating Companies at certain stations. The risk to employees, customers, suppliers, the public and others with respect to train operation over Network Rail infrastructure is addressed in general terms as part of the above risk assessment

processes. However there are some differences in the responsibilities and controls for risk between Network Rail and LU.

Quantitative assessments have been undertaken to identify specific issues. This is where an additional hazard or a higher hazard likelihood or consequence may arise due to operation of the Bakerloo line and District line services on Network Rail infrastructure. These assessments were carried out by a knowledgeable group of operational and safety specialists from LU (with support from NR, train operating companies and station operating companies where appropriate) making reference to the LU QRA as well as other relevant information. The relative significance of the risks associated with the external interfaces of train operations is qualitatively assessed as high, medium or low.

LU has conducted risk assessments to identify the risks arising due to interfaces when:

- other operators run over LU infrastructure
- LU trains run parallel to Network Rail infrastructure
- LU stations interface with other operators' services.

The findings of these assessments are, where applicable, integrated into the LU QRA. Risk reduction measures arising from these assessments are developed in liaison with those LU interfaces, via appropriate Interface Managers. LU also attends various specialist topic groups with railway industry bodies, e.g. RSSB, to discuss various risk reduction measures.

4.4.11 Risk assessment for interfaces with third parties

LU's activities often interface with third parties, e.g. where work is carried out adjacent to LU infrastructure. This could potentially increase LU's risks. LU has a dedicated outside parties team within the Capital Programmes Directorate to manage this in instances where:

- there is a risk to LU assets
- designs and method statements need to be reviewed
- there is a requirement for technical judgement or detailed knowledge of assets
- access needs to be arranged and work needs to be supervised.

Works that interface with third parties are managed in accordance with the LU standard for the control of outside party operations and works.

Risks to the safe running of the railway and safety of LU staff and customers which are associated with the activities of other persons on LU's property, e.g. visiting contractors, are managed through the access process (Section 1.12). LU's Category 1 Standard: The Assessment and Management of Health, Safety & Environmental Risk requires that LU and suppliers assess the health and safety risks and environmental and assess the impacts arising from:

a) their own operations
b) interfaces with other parties and operators
c) third party activities
d) normal, abnormal and emergency conditions

4.4.12 Communication and use of risk assessments

Risk assessment findings are communicated through presentations of the significant risks to the Rail and Underground Board for acceptance via the Health, Safety, Environment & Climate Change Programme Board. The LU QRA findings are communicated to Tube Lines through the Risk Assessment Forum, and to LU managers through a series of presentations. The WRA and CRA findings are communicated by local managers to staff via Health and Safety Representatives, notice boards and inductions.

At a network and asset-based level, the findings of risk assessments enable LU to develop a risk based approach to business planning. Areas or activities for which risks are not tolerable and ALARP can be identified and programmes developed to address this. The ranking of the LU QRA Top Events, i.e. LU's safety risk profile, identifies priority areas against which programmes can be developed to reduce the LU safety risk profile. Section 6 provides further details of LU's business planning arrangements. Additionally, the LU QRA is used to inform LU's network safety and technical assurance arrangements, as outlined in Section 13, which monitor the effectiveness of risk controls.

At a local level, employing managers use relevant risk assessments to develop and implement local action plans with advice from their HSE Adviser, to reduce risk within their area of responsibility. They are also responsible for identifying actions which are wider than the local station groups ('corporate actions'). The GM HSE Operations and Asset Performance is responsible for ensuring the appropriate responsible managers within the LU Group are identified to implement the corporate actions. These managers are then responsible for ensuring the actions are implemented. As with the network risk assessments, local assessments are used to inform the local monitoring arrangements outlined in Section 2.

LU's risk assessments and the LU QRA are used to identify pre-cursor events which are then monitored as described in Section 2.7.

4.5 Revision history of this section

Revision Number	Date	Changes
V2 (as Version 2.00)	October 2011	Five year renewal of LU's Safety Certificate and Safety Authorisation

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Section 5: LU documents

Contents

5.1 Safety, operational and technical instructions and requirements

Section 2.4 described the LU Management System, including maintenance processes and management of non-compliance. This section describes LU's system for ensuring safety, operational and technical requirements are managed and communicated effectively.

All documents, including LU standards, are contained in the Management System library. This database provides access to all company documents for TfL/LU employees (via the LU intranet) and suppliers (via the internet). This facility ensures that users are accessing the latest versions of the Manager's Handbooks, Project Manager Framework handbooks, standards and all other documents. The library is structured as set out in Table 5.1.

A bulletin listing all current LU standards is issued every four weeks via the LU intranet and the internet site for LU suppliers. This highlights additions, deletions and amendments. Once implemented, Manager's Handbooks (including PMF) and standards are required to be complied with as set out in Section 2.4. Monitoring and assurance arrangements have been established to ensure that this is achieved. LU has also established arrangements for any corrective actions identified by monitoring and assurance activities to be progressed through to completion. The following sections in this document explain how this is achieved:

- Section 2.7 – monitoring, including corrective action and action tracking
- Section 7.4 – changes to standards
- Section 11 – safety and technical audit
- Section 13.7 – safety and technical assurance.

Standards, and the supporting documentation, provide clear direction on the stage of a process to which the standard applies, e.g. all or specific stages of a process.

LU's processes for complying with Railway Group Standards, where appropriate, are set out in Section 2.4.6. Requirements for Network Rail to comply with LU requirements, where relevant, are set out in the relevant agreements with Network Rail or Train Operating Companies (as described in Section 12.7).

Standard topic	Sub-group
People	• Competency and licensing • Customer interface • Management • Security • Training
Stations	• Station assets (further subdivided by station asset type – infrastructure, civils, premises, power, lifts and escalators) • Station operations
Trains	• Train assets (further sub-divided by train asset type – signalling, rolling stock, permanent way and communications) • Train operations
Safety and fire management	• Health, Safety and Environment (HSEMS) • Fire
Management and assurance	• Business • Standards management
Systems	• Systems assets
LU Rule Book	• Operational Standards/Rules
Other related documents	• Line Supplements • Ancillary • Defective In Service Instructions
LU and Tube Lines Category 2 Standards	• E-library links • Catalogue

Table 5.1 Topic structure of the LU standards e-library

5.2 Revision history of the document

Revision Number	Date	Changes
V2 (as Version 2.00)	October 2011	Five year renewal of LU's Safety Certificate and Safety Authorisation

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Section 6: Business Planning, Target Setting and Safety Improvement

Contents

6.1 Overview of this section

LU's Health, Safety & Environment Policy commits LU to setting progressive objectives and targets to improve HSE management and performance. Over the past 15 years, LU has placed increased focus on improving its safety performance through a sustained focus on defined areas (taking a risk-based approach), combined with a focus on continuous improvement of the Safety Management System (which has subsequently been integrated into LU's Management System). This is supported by the business planning and target setting process described in this section. This approach has resulted in a significant improvement in LU's safety record which can been seen in the reduction in customer and employee accidental fatalities, in-service derailments and employee major injuries.

LU continues to aim to improve the health and safety performance of the LU network for customers, employees and suppliers and is working towards a goal of ever decreasing health and safety risk. Focus is maintained on this goal by the Health, Safety, Environment and Climate Change Programme Board (Section 2.3.1) who ensure that challenging targets are set each year and that agreed strategic safety improvement actions are delivered. Targets are cascaded from LU's top level scorecard to local scorecards as appropriate. The number of targets on each scorecard is not set at a defined number. Targets which will drive safety improvement are set at the start of each financial year for each part of the business as relevant.

Section 4 described arrangements for the assessment and control of risk. The assessment of risk recognises that neither engineered nor management controls are infallible, and takes into account the likelihood of failure of controls. The judgment on whether risks are ALARP is based upon consideration of what additional measures can be reasonably practically implemented to reduce risks further. This section describes how decisions relating to improvements in safety performance can be made. The output from risk assessment, change management and statutory obligations processes feed into the business planning and target setting processes described in this section.

The purpose of health and safety planning is to put in place appropriate requirements to consider health and safety in all activities. This is in order to:

- comply with statutory and LU requirements
- ensure policy commitments are achieved
- establish objectives for safety improvement to ensure risks are ALARP
- allocate resources on a risk based priority.

Safety planning within LU has been an integral part of business planning for many years. Many of the significant long-term risk reduction measures are incorporated within the long-term capital investment programme through assets improvement regime and systems.

This section explains:

- the approach to corporate planning
- the main components of planning for health and safety
- how these processes mitigate and control safety risks.

6.2 Business Planning arrangements

LU activities require a strategic and sustained level of planned investment to ensure assets are fit for purpose over the whole of their planned life. Therefore it is essential that LU can confidently plan and predict capital investment requirements over a number of years.

At the corporate level, this is achieved through four principal mechanisms:

- the Corporate Business planning cycle including investment appraisal
- the Safety Improvement Plan (SIP) and associated performance measures
- the PPP, PFI and other contracts which deliver infrastructure management and improvements
- the review of Asset Group Strategies (AGS) and associated Annual Asset Management Plans (AMPs).

The mechanisms for decision making are captured in the TfL Business Case Development Manual (BCDM). This manual contains the investment appraisal process of which health & safety is an integral part. This allows prioritisation of resource allocation to ensure aims and objectives are met.

LU's requirements for ensuring that health and safety is addressed as an integral part of the planning processes are contained in the LU Category 1 Standard: Business Planning. The standard outlines requirements for:

- the consideration of health and safety within all business plans
- the development of the Safety Improvement Plan
- a safety review of the corporate and Directorate business plans
- LU's input into the Railway Group Strategic Safety Plan (as appropriate).

The output of these processes is the Business Plan and Safety Improvement Plan (SIP). In support, each Directorate develops its own action plans that contribute towards delivery of the Business Plan and SIP.

6.3 LU Business Plan

The Director of Strategy and Service Development is accountable for ensuring that LU has a long term plan which meets its strategic objectives. The Director of Finance is accountable for the production of the LU Business Plan which sets out a resourced plan aligned to LU's strategic objectives for the budget year and the defined plan period. The LU Category 5 Standard: Business Planning outlines the arrangements to be followed during the business planning cycle. The business planning processes contribute to delivery of the LU vision which influences the management of safety risks. Once the LU Business Plan is accepted by the Rail and Underground Board, each Director is accountable for ensuring that safety is addressed within their Directorate plans.

The strategic framework drives LU's plans and long term measures and targets through the following mechanisms:

- the LU Business Plan and Asset Management Plan (both part of the TfL Business Plan) which provides the financial vehicle for the corporate

strategy. The LU Business Plan defines the priorities and programmes to be delivered to 2020/21. The annual Asset Management Plan sets out the project and maintenance activity funded in the Business Plan.

- the LU Plan is an annual plan which sets out LU's major change programmes and milestones for the coming year. It includes the corporate and director level scorecards. It supports the longer-term LU Business Plan.
- scorecard metrics: the scorecard is aligned to the strategy and is designed to stretch Business As Usual (BAU) performance. This is cascaded from the top of the organisation to the bottom. [Safety metrics are described in Section 2.7.]
- codified ways of working and managing business as usual in the Manager's Handbooks and other associated documents, standards, the Rule Book, etc. (the Management System)
- performance and Development (P&D) allocates objectives to individuals. The role of the individual will determine the mix of LU Plan, scorecard and Management System objectives to be achieved in a given financial year.

The content of the LU Business Plan reflects statutory requirements, LU's Health, Safety and Environmental Policy, requirements for safety, health and environmental improvement and provides an appropriate balance between health, safety and environmental risks and resources.

In order to achieve this, inputs to the strategic planning include:

- external influence such as any new legislation and government intervention
- outputs from quantified customer and workplace risk assessment
- customer and public concern
- outputs from safety and business reviews
- resource planning.

The LU Director of Health, Safety and Environment is accountable for advising the Board on appropriate health and safety objectives and supporting the development of the plans.

6.4 Performance Scorecards

LU has implemented a system of performance scorecards at company, directorate and business unit levels, as appropriate, that facilitates the setting and monitoring of performance targets. The purpose of these scorecards and targets is to drive a change in performance, including improving safety performance. The process and accountabilities for scorecard setting are described in the Manager's Handbook: Business and resource planning.

Safety is an element of the performance scorecards. Typically the performance scorecards include relevant safety performance indicators such as:

- major injuries per million hours on LU infrastructure
- Lost Time Injuries (LTIs)/Injuries per 100,000 hours worked
- major asset failures

- signals passed at danger

Targets are developed annually and agreed by the board at corporate level and then cascaded into the business. The monitoring of performance against targets is undertaken period by period throughout the year at LU, directorate and business unit level. The directors review operational performance at the Rail and Underground Operational Meeting (RUOM) and more frequently through visualisation meetings in the local areas. All LU scorecards and the status of performance against targets are available on the LU intranet.

The results of performance scorecards are utilised in the setting and monitoring of the performance of individual managers as described in Section 8.4. Where the required safety performance is not being achieved, appropriate improvement plans are put in place, as described in Section 6.5.

6.5 Safety Improvement

In addition to LU's business plans and the performance specification within contracts, the LU Director of Health, Safety and Environment is accountable for developing the strategic and tactical safety improvements necessary to make a step change in safety performance and culture. Areas for improvement are identified through company wide analysis of the underlying causes for safety management issues and through the analysis of risk assessments, incident investigations, safety performance trends and audits. The resulting actions and improvement targets are monitored through The Plan or through local action plans.

Once significant improvement actions have been identified, the action is reviewed by the Health, Safety, Environment and Climate Change Programme Board or via DRACCT, to ensure that there is a robust implementation plan with appropriate key milestones. In addition, this review process ensures that:

- appropriate accountable managers and action managers are identified
- a clearly defined scope of work, deadlines and completion requirements are defined
- an assurer is identified
- requirements for assured closeout are defined.

Accountable managers for delivering the improvement action are identified for all improvement actions. The accountable manager is responsible for ensuring that appropriately detailed implementation plans are developed and regular updates provided.

Milestone dates for each action provide a means to effectively monitor progress through to assured close out including success measures key to delivery.

The measures that are used to monitor LU's and suppliers' safety performance provide a means by which overall safety performance are reviewed annually to allow strategic level decisions to be made for the forthcoming Health, Safety and Environment Improvement Plans. The findings and recommendations of this review are reported to the LU Health, Safety and Environment and Climate Change Programme Board.

The Directors and managers with risk control accountabilities are responsible for deciding and acting upon the results of the analysis and review of safety performance, with advice from the LU Director of Health, Safety and Environment and their team.

On a rolling plan basis, each director is accountable for ensuring that progress against their action plans is reviewed by their management teams and updated accordingly.

At least twice a year the LU Director of Health, Safety and Environment reports to the Board on progress on the safety aspects of the LU Business Plan via the HSECC Programme Board. This report discusses the effectiveness of the plan in terms of progress against the programme and the outputs measured in terms of the performance indicators outlined in Section 2 and the profile of risk. This gives the Board the opportunity to review the effectiveness of the plan and agree remedial action if necessary. LU shares plans, good practice and delivery of joint objectives with Tube Lines.

The Health, Safety and Environment Improvement Programmes are part of the LU Plan which is published on the intranet.

6.6 Business Case Development

All projects involving capital expenditure, changes in day-to-day operating expenditure and setting and revising standards are prioritised and budgets allocated in accordance with the Business Case Development Manual (BCDM) in order to justify and prioritise spending within LU. The BCDM sets out the steps and methodology for making a business case. The purpose of this process is to identify the effects that any course of action has on both the finances of the company and LU's ability to deliver a safe service.

In principle the appraisal process must follow a number of key steps. These include:

- define objectives, and outputs against which the project can be monitored
- define the current position
- develop options
- identify all costs and benefits at current price
- carry out appraisal.

The BCDM process requires consideration to be given to the safety risk benefits and dis-benefits as part of the appraisal. These must be quantified and expressed in terms of number of fatalities against a given proposal in line with the LU Category 1 Standard: Safety Decision Making.

6.7 Performance Specification and Asset Management

As Infrastructure Manager, LU is required to ensure the fitness of infrastructure to meet a defined purpose. This is primarily discharged through LU's Asset Management activities, the PPP, PFI and third party supplier contractual arrangements as described in Section 13. These arrangements form an integral part of LU's systematic and planned improvements to the whole network.

LU's asset management regime involves monitoring, reporting on and regular review of performance against targets set in Directorate Scorecards, specifically the Capital Programmes Directorate and Asset Management Directorates. Tube Lines is responsible for producing an asset management regime to show how it meets the obligations contained in the PPP Contract and other LU infrastructure safety related requirements. Delivery against the Performance Specification set out the PPP contract is measured regularly.

The Asset Management Regimes, as well as contributors to LU's planning process, such as the output from asset risk assessments, are drawn together in the Annual Asset Management Plans.

The Strategy and Service Development Directorate, with support from the Capital Programmes and Asset Performance Directorates, ensure the Asset Management Plans reflect the network requirements, the Asset Management Strategy and PPP Contract. Tube Lines provides assurance against these plans for the infrastructure for which it is responsible.

6.8 Local Action Plans

Safety related actions arising from location specific risk assessments, monitoring and audits are captured in local action plans. For each action, timescales and an accountable manager are allocated. Progress against these plans is monitored by local management. The HSE Audit Programme includes checks to ensure local safety improvement actions have been implemented.

6.9 Railway Group Safety Plan

The HSE Directorate (Head of HSE Operations and Asset Performance) is responsible for ensuring that LU is involved in the Railway Safety and Standards Board (RSSB) led discussions on the Railway Group Safety Plan to ensure that:

- LU has visibility of the development of the Railway Group Strategic Safety Plan to provide a comparative benchmark for its safety improvement programme
- LU defines suitable actions to meet any commitments required as a train operator on Network Rail infrastructure.

LU, through the Head of HSE Operations and Asset Performance, contributes to the RSSB plans to deliver Railway Group Safety objectives as required.

LU is also a member of the Community of Metros (CoMET) which allows benchmarking against non-UK metros and identification of best industry practice and safety improvement opportunities that may arise from this.

6.10 Revision history of this section

Revision Number	Date	Changes
V2 (as Version 2.00)	October 2011	Five year renewal of LU's Safety Certificate and Safety Authorisation

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Section 7: Safety assessment of change and the control of new risks

Contents

7.1 Overview

LU's change management arrangements ensure that the safety implications of any change, introduced by any party affecting the LU network or its operations, are assessed before the change is made. LU's change management and assurance processes have developed over the past five years to ensure the more effective control and verification of change, including clearer accountabilities for relevant roles. The changes include introduction (and subsequent improvement) of new standards (LU Category 1 standards: Assurance and LU Category 5 standards: Verification of Assurance and Safety Verification) and improving the governance for managing change, i.e. through DRACCT (Section 2.3) and development of a cross-business Management System (Section 2.4) with relevant change management processes. These changes, details of which are described below and in other parts of this document, have resulted in a more robust change management and safety verification process in LU. The processes have been used to identify and manage risks resulting from changes over the past five years such as the introduction of new rolling stock, new signalling systems and organisational restructure. The Project Management Framework includes requirements for lessons learnt to be formally reviewed and shared to ensure that future projects build on previous experience.

The objectives of change management are to:

- correctly identify the safety implications of proposed changes
- ensure changes are planned safely
- ensure changes are implemented safely.

LU requires the objectives above are met whenever any change is implemented. This is achieved through application of the LU Category 1 Standard: Assurance via the Manager's Handbook on Change Control. This contains LU's requirements for the provision of safety assurance by the party introducing the change and the verification of that assurance by LU. This standard also outlines the assurance arrangements in the context of the asset base. Further details on assurance are contained in Section 13.

LU's requirements for communication with managers and employees is an important aspect of change control. Requirements for health and safety communication and consultation are defined in the Manager's Handbook and described further in Section 2.6 and Section 9. The requirements are supported by general safety training for managers, which covers risk assessment, assurance and verification of change. The involvement of Trade Union Health and Safety Representatives in consultation on changes, e.g. through Change Assurance Plans, as required by LU standards in the change management process, has also promoted and raised the visibility of change management requirements and processes.

7.2 Change management

The requirements to safety assure and verify changes apply to changes that could affect the safety of anyone affected by LU operations. The scope of the change management process includes:

- organisational or management changes

- changes to staffing levels
- operational changes
- changes to the Management System, including standards
- changes to assets
- changes from third parties, e.g. other transport undertakings, which impact on LU
- impact of LU changes on third parties, e.g. other transport undertakings
- changes to inspection or maintenance regimes.

Routine changes and deviations, carried out in accordance with authorised standards, procedures and instructions, are not included in the scope of the LU Category 1 Standard: Assurance, as they are an integral part of day-to-day activity which will have already been considered and allowed for in the development of the specified safe systems of work for carrying out these activities.

7.3 Change management process

The LU change management arrangements describe the responsibilities and actions to assess, review and implement changes. The manager or executive body, e.g. RUB or DRACCT, with the authority to approve a change ensures this is complied with.

When a change is proposed, the safety risks of the change are assessed in accordance with the risk assessment arrangements described in Section 4 as required by the LU Category 1 Standard: Assurance (further described in Section 13.7). This includes an assessment by a competent safety assessor of the risks both during the change and on completion. As part of this process, consultation is undertaken with affected parties, including Health and Safety Representatives where the change affects employees' health and safety. This process applies to changes proposed within LU or by a third party, e.g. another transport undertaking.

Where changes have safety or other risks implications, a Change Assurance Plan (CAP) is produced which:

- assesses and records the impact of the change (including safety assessment)
- demonstrates how safety risks will be maintained or reduced to a level which is ALARP before, during and after the change.

On completion of the necessary reviews and approvals, including DRACCT approval, the change is communicated to all affected parties and implemented in accordance with the measures stated in the Change Assurance Plan and Verification Activity Plan. The Change Assurance Plan will include, as appropriate, communication to relevant staff (or third parties) before, during and after the change. The DRACCT process explicitly requires the change proposer to identify any required changes to training, coaching, briefings or other communication which would result from the change. These will be incorporated into appropriate training or information mechanisms as described in Sections 8 and 9 respectively.

The assurance process requires appropriate validation and verification activities. These requirements are set out in the Category 1 Standard: Assurance and are integrated into the Manager's Handbook where necessary, e.g. the Project Manager's Framework.

The Verification Activity Plan (VAP), which may be part of the CAP, identifies, based on a risk-based approach, specific issues which require monitoring during and after the change to ensure safety risks are managed effectively. Where necessary, the VAP will include requirements for the monitoring of defined control measures following the change to ensure that the change has had the intended impact. This applies to works carried out by LU and work carried out by suppliers on LU's behalf. Change Assurance Plans are made available on the intranet. Changes which are complex or pose significant safety risk are subject to peer review and acceptance by the Director's Risk, Assurance and Change Control Team (DRACCT).

As LU's assurance standard is a Category 1 standard, Tube Lines and other suppliers are required to have arrangements in place to provide safety assurance in line with this standard. PFI Suppliers are required to co-operate with this process through the terms of their contracts.

7.4 Changes to standards

Change to an existing LU standard, or the development of a new standard, may be required as a result of the output from the risk assessment process, corporate planning processes, safety related incidents, local identification of a need or an external influence such as legislation/external standards. Any party may propose a new standard or a change to an existing standard.

The safety assurance requirements have been integrated into the standards change documentation. Each proposal for a new LU Category 1, 2 or 5 standard, or change to an existing standard must be safety assured in accordance with the change management arrangements described. This involves a review of proposed changes by DRACCT, consulting with Trade Union Health & Safety Representatives where employee health and safety could be affected. Tube Lines is also consulted when Category 1 standards are changed. Tube Lines is also required, via an LU Category 1 standard, to operate controlled processes for the change (creation, re-grading or withdrawal) or concession to Category 2 standards. The standard requires consultation with all parties likely to be affected by a proposed change and for safety validation. A further constraint prevents any increase in safety risk or cost being imposed on LU as a result of changes introduced by Tube Lines.

7.5 Peer review

The effectiveness of the change management processes depends on compliance with the process and on the quality of the safety assessment and the management of the implementation of the change.

For changes that are complex or pose significant risk, DRACCT provides an effective overview of the assessment's quality and provides documented feedback to managers on what further assurance may be required. DRACCT will accept the case when a robust case has been made.

Changes which constitute a significant change to the LU Safety Certification/ Authorisation are advised to Office of Rail Regulation (ORR). They are also notified to other affected operators to enable them to highlight any concerns to ORR.

For less significant changes, the HSE Managers, working with their counterparts in the Tube Lines, PFI Supplier or other supplier organisations where appropriate, provide an overview of the implications of change to ensure safety issues are adequately addressed.

7.6 Implementation of change

The manager authorising a change is responsible for monitoring the implementation of the change and ensuring it is carried out in accordance with the accepted Change Assurance Plan (CAP). Safety significant actions are also entered onto The Plan (as described in Section 2). During more detailed planning or implementation, if a need is identified to significantly deviate from the proposals in the accepted Change Assurance Plan, the authorising manager is responsible for ensuring that the safety implications of the deviation are assessed and a revised Change Assurance Plan is developed and accepted.

7.7 Safety verification

Where new or altered vehicles or infrastructure that is significantly different from current operations are introduced and they bring the potential for a significant increase in existing levels of risk, LU implements a written safety verification scheme in accordance with Railways and Other Guided Transport Systems (Safety) Regulations.

The Head of Engineering (Capital Programmes) has overall accountability for the safety verification processes and is designated, in the LU Category 5 Standard: Safety Verification, as LU's Independent Competent Person (ICP). This is discharged through the relevant professional heads of asset disciplines who are independent of delivery functions and who maintain sufficient levels of asset domain and systems engineering competence to allow LU to fulfil its statutory obligations for safety verification.

Where safety verification activity is required, the independence of the Head of Engineering, and/or any resource which is appointed to undertake safety verification, is achieved through transferring line management responsibility from the Capital Programmes Director to the LU Director of Health, Safety & Environment (or a person appointed by the LU Director of HSE). The LU Category 5 Standard: Safety Verification requires that the resource to undertake safety verification, singularly or collectively:

- has, or has access to the knowledge of the technology being verified. This may include training provided by the supplier of the technology to enable specific knowledge to be gained
- has the skills and experience to carry out the safety verification
- has not been responsible for the matters being considered by the safety verification
- is independent of the management chain for the matters being considered by the safety verification
- provides coverage of all items requiring safety verification.

This includes the effective planning, organisation, control, monitoring and review of preventive and protective measures in relation to safety verification activities

The designated competent person is determined by the nature of the change/asset type. The specific LU requirements for safety verification schemes are contained within the HSEMS standards for Assurance (Category 1) and Verification of Assurance (Category 5) and Safety Verification (Category 5). The standards set out the requirements for:

- LU's competent person
- information/documentation flows
- the examination and testing of new or altered vehicles and other assets
- the criteria for safety verification
- reviewing and revising the safety verification arrangements when necessary
- record keeping to provide evidence all aspects of safety verification.

For projects which require safety verification, a Verification Activity Plan (VAP) is required, in line with LU Category 5 Standard: Verification of Assurance. The VAP is the mechanism through which LU drives the delivery for a written safety verification scheme.

These requirements are embedded in the Project Management Framework (PMF), which is part of the LU's Management System and is mandatory for LU programmes or projects.

7.8 Revision history of this section

Revision Number	Date	Changes
V2 (as Version 2.00)	October 2011	Five year renewal of LU's Safety Certificate and Safety Authorisation

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Section 8: Competence management and training

Contents

8.1 Overview

In order for arrangements for HSE management to be effectively implemented and operated, it is essential that employees and others who work on or about LU's infrastructure are competent to do so. TfL and LU have comprehensive arrangements for the management of HSE competence to ensure that this is achieved through all levels of the workforce.

The employees who provide the services and support outlined in this document consist of TfL and LU employees. In general, LU employees are those who are actively involved in operational, maintenance and project roles while TfL employees are those who provide functional support to the Underground. While there are significant similarities behind the principles of competence management and training, some TfL and LU processes differ. Figure 8.1 (below) broadly identifies employees as LU or TfL employees, by directorate. Tube Lines employees work to Tube Lines procedures, policies and standards. LU Category 1 standards are applied in Tube Lines through Tube Lines' processes.

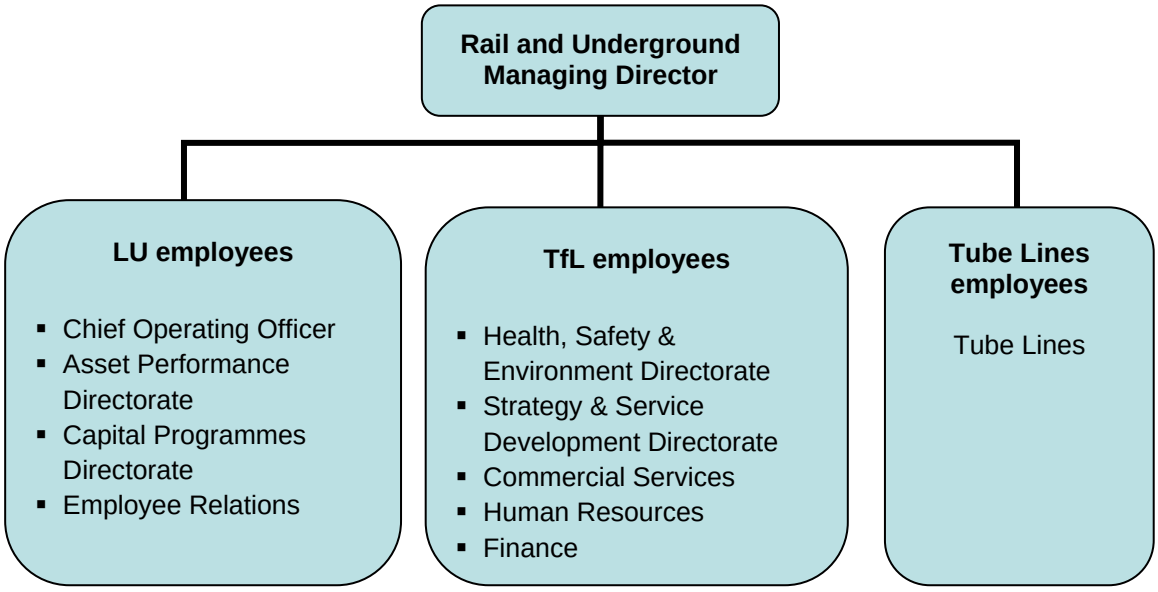

Figure 8.1 TfL, LU and Tube Lines employees

This section describes TfL and LU general arrangements for managing employee competence and specific arrangements where work activities are identified as safety critical. This section describes:

- processes for recruitment, training, assessment, monitoring and record keeping in respect of competence for all levels of employees
- how competence is achieved and maintained
- systems for ensuring that activities with safety implications, including safety critical activities, are identified.

The accountabilities and responsibilities for the management of competence are described in Section 2. Section 2 also described governance arrangements that provide the means by which senior management get visibility of HSE-related competency issues

through the review of improvement programmes, HSE performance, audit results and incident investigations.

8.2 General arrangements for managing employee competence

Responsibilities for managing employee competence across LU are discharged through Human Resources (HR) standards covering:

- recruitment and selection of staff
- performance management
- on-going learning and development
- conduct and discipline
- drugs and alcohol at work

These standards cover LU employees. TfL policies and processes apply to staff who provide functional support to London Underground e.g. HSE and HR staff. There are minor differences between the TfL and LU standards and policies.

The Health, Safety and Environment directorate is, broadly speaking, staffed by TfL employees. The Director for Health, Safety and Environment is accountable for ensuring that LU has the necessary safety competence in place to meet the requirements of LU's Management System, including relevant standards and legislation, and the professional qualifications in the relevant disciplines.

8.3 Recruitment and selection of staff

The HR requirements for recruitment and selection of TfL and LU employees supports the organisation's aim to attract well-motivated people, who will enable TfL/LU to achieve its objectives and deliver LU's services safely and effectively.

The recruitment and selection process is:

- based upon a person specification and job description for each post that describes the experience, knowledge, skills, behaviours and qualifications required for successful job performance
- designed to consider each applicant objectively against job requirements and make appointments in accordance with these.

These processes are measured and monitored for fairness, reliability and validity to ensure that the TfL/LU objectives for recruitment and selection are met.

8.4 Performance management

The effective performance management of employees helps achieve LU's goals and objectives. It ensures that employees individually and collectively understand how they can contribute towards the achievement of these goals and objectives. The Performance and Development process provides company standards for target setting and measurement.

Specific requirements relating to Performance Management of employees include:

- cascade of objectives and targets (based on relevant business plans and objectives) to the individual employee through the management chain
- targets and performance standards being set and monitored (on a day-to-day basis and/or at formal review sessions) by employing managers for each individual based on employees job description and person specification
- appropriate strategies linking reward with performance against targets and performance standards
- managers identifying the individual strengths and weaknesses of employees through performance review and developing, with employees, appropriate personal and career development plans
- the recording of information relating to performance on the appropriate documentation along with targets/objectives and performance reviews.

Performance and development management is carried out informally and formally. Managers are encouraged to regularly discuss individual and team performance with their team. The Management System sets a requirement for managers to carry out a formal discussion of performance and development at key points in the year. These formal review meetings provide the opportunity to review performance against previously set objectives, clarify expectations and standards and to identify related development needs.

LU's Management System requires managers to intervene as soon as possible where the performance of an individual requires improvement. The stages of intervention are set in the Manager's Handbook: Performance and Competence Management and in Table 8.1 below.

Situation	Action to be taken	Type of discussion
Normal day-to-day performance	Manager must • explain required standards and the impact of performance. • act as a role model / coach. • explain process if standards are not achieved. • keep notes of discussion.	Informal
If performance issues occur	Manager and member of staff must discuss the situation as soon as possible, agree actions and timescales and keep a record of the discussion.	Informal / recorded

If performance concerns continue	Improvement Action Plan must be produced and linked to the Performance and Development paperwork. Manager must explain that failure to achieve the standards required with the support and timescales outlined in plan could lead to use of the Discipline at Work Procedure. Manager and member of staff must keep record of discussion and agreed actions.	Informal / recorded
Where standards are still not met despite support, guidance and reasonable timescales	Application of the Discipline at Work procedure	Formal

Table 8.1 Performance Management: stages of intervention

8.5 Operational learning

In accordance with LU's Management System, all LU employees receive the appropriate training and learning and development to enable them to perform their jobs safely and effectively. General requirements include:

- employees to have a development plan which is reviewed regularly. This assists them in fulfilling their potential to perform a high standard within their present job and, where appropriate, to further their future career
- access to learning and development advice, guidance and opportunities are available to all employees through a variety of media including computer based training
- equipping employees in managerial and supervisory positions with the skills required to assist those for whom they are responsible in identifying their own development needs and the knowledge to ensure that steps are taken to meet those needs
- monitoring and evaluation of the efficiency and effectiveness of all operational learning activities with a view to continuous improvement.

Those who undertake competence assessments in respect of safety critical and non-safety critical employees are selected, and accredited in line with the requirements of the relevant National Occupational Standard on competence. This allows maintenance of competence as an assessor (e.g. A1/A2) and competence in the skill being assessed.

8.6 Code of Conduct

The purpose of the TfL and LU Codes of Conduct is to outline the standards of conduct and personal performance which TfL/LU expects of its workforce. Breaches of the relevant Code of Conduct may lead to disciplinary action (detailed below). The Codes of Conduct covers information on general conduct and, where relevant, working

relationships, attendance, uniform and name badges, etc. In terms of safety, TfL and LU employees are required to:

- comply with all relevant health and safety legislation
- comply with all smoking restrictions and company standards and local restrictions in relation to smoking
- report accidents and incidents immediately to a supervisor or manager and co-operate with any investigations
- use and maintain any PPE issued to them in accordance with instructions and training.

In terms of fitness and competence for work, employees are required to:

- ensure that they are fit for work and meet any job-related health and/or fitness requirements
- consult their supervisor or manager before starting work if they could be unfit to work for any reason.

The relevant Code of Conduct is communicated with employees during their induction process. The HSE policy is also communicated at this stage.

8.7 Discipline

If, following discussions and relevant performance management, employees continue to fail to meet the required standard of conduct, the Disciplinary Procedure is applied. TfL/LU expects a high standard of personal performance and conduct from its employees and believes that most employees will not find it difficult to meet these standards. Therefore, the disciplinary procedure should only need to be applied in a small number of cases. The principles of the discipline process include:

- guidance and the opportunity to improve performance are given to employees before formal disciplinary action is taken. If no improvement is made, the disciplinary procedure will be followed.
- in cases of gross misconduct, formal disciplinary action at a disciplinary hearing shall always be taken as soon as practical. This may lead to dismissal without notice. The failure to follow safety procedures and/or rules, thereby affecting, or potentially affecting, the safety of the employees or others will be subject to the disciplinary process as well as failure to comply with the LU Alcohol and Work and Drugs and Work standards (or TfL Drugs and Alcohol Policy) detailed below.

8.8 Drugs and alcohol at work

LU's arrangements for ensuring that all employees are aware of their responsibilities are set out in the LU Category 1 Standard: Alcohol and Work, the LU Category 1 Standard: Drugs and Work and the TfL Drugs and Alcohol Policy (for LU and TfL employees as relevant). TfL and LU standards require that all employees ensure that their work performance is not affected in any way by consumption of drugs or alcohol. Specific requirements are defined in the standards/policy and performance against these requirements is monitored. The application of the Alcohol at Work and Drugs at Work

standards is included as part of training for operational and duty managers who undertake checks of operational staff when they book on for duty.

Requirements of these standards are managed through unannounced alcohol and drug testing for employees undertaking safety critical activities. This includes for cause and post incident screening for LU employees. For cause screening takes place when a manager or supervisor has reason to believe an employee may be under the influence of alcohol or drugs. Post incident testing occurs after an incident.

Arrangements are also established for employees seeking employment in a designated safety critical role. Potential employees undergoing the recruitment process are tested for alcohol or drugs where the post requires it. In accordance with TfL and LU policies, staff failing the alcohol or drugs test will not be employed and records will be maintained for future reference.

TfL and LU employees are responsible for informing their managers when taking any prescription or non-prescription drugs by their General Practitioner or a doctor which could affect their performance whilst at work. These requirements are communicated to all employees and suppliers prior to them starting work on the LU network.

8.9 Safety critical work

The ROGS Regulations, place specific requirements on employers to ensure that employees are suitably trained and supervised when carrying out safety critical tasks as part of railway operations. LU discharges these obligations through its Competence Management System which identifies what competence needs to be managed in relation to the risks pertaining to each task.

A systematic assessment of the activities undertaken on LU infrastructure has been undertaken to identify roles that should be designated as safety critical. The regulations relating to safety critical activities identifies broad categories of activity. LU has used these categories as a baseline against which LU's activities have been assessed in order to identify those that LU designates as safety critical (in accordance with and critical to safety in addition to the Regulations). This systematic analysis is supported by the application of the risk assessment processes described in Section 4. In the event that new activities are introduced in respect of operations or infrastructure, the implications of the change are required to be the subject of assessment in line with the change control process. The application of this process ensures that additional safety critical activities are identified and addressed in accordance with LU standards for competence. LU Category 1 Standard: Safety Critical Work lists those activities deemed to be safety critical.

Any authorised member of LU staff, Office of Rail Regulation (ORR) (TfL Team) Inspector or other similarly authorised person, may make reasonable request, from the relevant employing manager, for assurance that an employee undertaking safety critical work is competent to do so. Such assurance is provided in reasonable time (ideally within 1 hour of the request) and further information about how that competence has been maintained at a later time with due regard to the administration of the Competence Management System.

8.10 Identification

A means of identification is required by LU to be carried when work is being carried out. This identification includes the photograph of holder, name and unique employee number. All other information can be made available on reasonable request, either in the form of a licence or through the Network Operations Centre.

8.11 Working hours and fatigue

The working hours of employees carrying out safety critical duties are strictly monitored to ensure the management of fatigue. LU's HSE policy sets out LU's aim to manage health and safety risks and operate effective risk control systems, including provision of employees with access to services which promote health and well being. This incorporates fatigue risk.

Rosters are developed in line with the Working Time Regulations and relevant framework agreements. Relevant aspects of the Office of Rail Regulation guidance on managing fatigue are considered, and staff are consulted, when developing new or amending existing rosters. Working hours are monitored locally and reviewed by senior management to ensure the risk of fatigue is managed effectively. Ad-hoc reviews are carried out by the Health, Safety & Environment Directorate to gain assurance fatigue is managed effectively .

8.12 Competence assurance and safety critical activities

LU complies with the Office of Rail Regulation Railway Safety Publication 001 Developing and Maintaining Staff Competence via the LU Category 1 HR Standard: Competence Assurance. This standard sets out responsibilities for ensuring the training and maintenance of competence. The under-pinning objective is to ensure that any individual who controls safety risk is competent to do so and that this competence can be demonstrated. The standard applies to those who undertake activities:

- that affect or have the potential to affect safe operation
- that affect occupational health and safety
- that are critical for controlling risk.

The standard outlines the high level requirements for LU employees and their suppliers when working on LU Infrastructure. Where a role involves operation over another Infrastructure Manager's infrastructure, the competence management process will include all of the necessary elements to operate on LU and third party infrastructure.

The activities detailed below are those which are deemed to be safety critical when carried out on the LU network. These include practical training in the areas identified and the additional LU activities that are not designated safety critical by the Regulations but are considered to be equivalent to the risk from activities within the scope of the Regulations and have been included within the LU designated activities. Individual sets of requirements, including relevant practical elements, have been developed covering each safety critical activity which detail the specific requirements for the activity. These requirements are maintained by the appropriate area of LU or supplier responsible for the activity. Typically, the individual requirements cover:

Railway operations

- Train operations
- Signal operations
- Station operations
- Degraded and emergency operations.

Engineering – installation, inspection, maintenance and repair

- track and structures (e.g. repairing and inspecting)
- pumps and drainage (e.g. checking, installing and maintaining)
- checking railway vehicles (e.g. maintenance and installation of components)
- use of rail vehicles and on-track machines
- signal engineering
- telecommunications systems (e.g. Installing, testing and maintaining)
- power supply, distribution and current collect system (e.g. installing, testing, and maintaining of)
- testing trains and use of test track.

Safety on the track

- Protection Master, Train Master and Possession Master duties.
- In addition to safety critical activities, there are activities that are not designated as safety critical but that do have safety implications in terms of decisions made. These are typically activities undertaken by operational managers and supervisors. Such activities are also subject to the LU competence management regime.

8.13 Implementation within LU

Individuals carrying out any work for which there is a competence management system are informed regarding the competence requirements and the content and frequency of any assessments / reassessments. The specific requirements for LU employees carrying out safety critical activities include:

- assessment requirements
- frequency of training/assessment
- LU standards references
- other assessment information.

These are detailed in the competence requirements related to their work activities. Requirements are set in respect of:

- initial training and assessment of knowledge on appointment
- location based requirements
- initial assessment of competence
- on-going assessment of competence.

On appointment to grade, initial training is given, an assessment of knowledge and competence is undertaken and location specific training is provided. After completing the core training, trainees are shadowed by a competent person (of the same grade) for

a period of time determined by the competence requirements (time varies depending on role). This is followed by a practical assessment where required by the competence management system. Subject to completion of this assessment and with reference to knowledge assessments conducted during core training, a means of identification is issued by the employing manager. A further assessment then takes place following a defined period where required by the competence management system.

The reassessment of competence is ongoing and timescales for when this is carried out are detailed in the relevant grade specific competence standards, e.g., COO employees receive regular refresher training, assessment against the standards contained in the LU Rule Book and against specific standards relevant to their work. This ensures that key safety information has been understood and maintained and enables safety critical staff to keep their authority to operate valid.

Competence is also monitored and reviewed by managers locally. LU ensures that those who do not meet the competence requirements are stopped from undertaking the activity. As well as the general performance management requirements detailed earlier in this section, managers of safety critical employees have additional responsibilities as follows:

- establishing and maintaining a register of all posts within their area of responsibility that are safety critical
- issuing and updating authority to operate
- monitoring hours worked
- ensuring that safety critical training and development requirements are kept up to date and competence assessment is carried out on a continuing basis.

Changes to the Competence Management System are subject to the assurance process and the task and risk assessments are reviewed at defined frequencies and whenever jobs change.

LU suppliers must establish arrangements to meet the requirements of the LU Category 1 Standard: Competence Assurance and LU Category 1 Standard: Safety Critical Work.

8.14 Managing staff fitness

LU's commitment in respect of the occupational health of employees is set out in LU's Occupational Heath Policy which is supported by the occupational health standards. The level of competency for providers of medical assessment for Track Certification and other Safety Critical Certification purposes is detailed in the LU Category 1 Standard: Providers of Medical Assessment for Track Certification and other Safety Critical Certification Purposes. Medical assessments for track and safety certification are only accepted from LU Occupational Health (LUOH) and Occupational Health Service providers approved by Tube Lines. These must meet the requirements of the Category 1 Standard.

The medical fitness of people working in LU track environments and/or carry out safety critical work is assured via regular medical assessments. The medical condition of staff is monitored throughout their employment, as outlined in LU Category 1 standards.

This is done via pre-employment medical assessment, and as required, fitness for duty medical assessments and examinations. Confidential Periodic Medical Assessments (PME) questionnaires are completed by safety critical staff at ages 20, 25, 35 and PME Assessments undertaken at the ages of 30, 40, 45, 50, 55, 60 and 63. Annual assessments are required at ages over 65.

Practical checks of vision and mobility, which occur every two years, are conducted by the local manager. In addition to this, staff are assessed daily when they book on for duty for general fitness and signs of drug and alcohol misuse and illness and/or medication. Where there is concern about safety, a referral is made to Occupational Health.

Occupational Health advice is given on a wide range of issues including medication/fitness for work, work related issues and rehabilitation programmes and advice on consideration of adjustments under the Equality Act.

Generic and post-trauma counselling services are also provided by Occupational Health, the content of which is confidential. However, an employee's manager may be advised if a person's condition may affect their ability to work safely.

8.15 Record keeping

Records of the competence of each member of LU staff, TfL employees who directly support LU or suppliers' employees/contractors undertaking safety critical activities are required to include as a minimum:

- each activity that the person has been assessed or reassessed as competent to carry out
- records of assessment completed
- the expiry date of the competence.

They are retained for a period at least equal to twice the normal period between assessments. In LU, and for TfL employees who directly support LU, employee training is recorded within Human Resources and/or by local management. This ensures that line managers are aware, in advance, of the expiry dates of licenses and training courses are programmed as necessary. This also ensures local managers are aware of details of any medical restrictions that may apply to their staff.

8.16 Revision history of this section

Revision Number	Date	Changes
V2 (as Version 2.00)	October 2011	Five year renewal of LU's Safety Certificate and Safety Authorisation

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Section 9: Safety information and communication

Contents

9.1 Overview

Communication of information relating to health, safety and the environment is an important aspect of LU's management control process. Good communication of health, safety and environmental matters:

- demonstrates management commitment
- enables concerns and questions to be dealt with in a timely and effective manner
- raises awareness of the health, safety and environmental issues and controls associated with LU's activities
- meets legislative requirements in respect of communication and consultation with employees
- motivates employees to support continuous improvement in health, safety and environmental performance.

Specific requirements for the provision of information of health, safety or environmental significance and the required format of this information are detailed in the appropriate LU Standards and described in the relevant sections of this document. Should changes be made to these or any other standards, the requirements for doing so are included in the appropriate LU standards.

This section details the arrangements for communication with:

- LU employees, incorporating corporate and operational communications
- the LU Group
- other railway operators
- regulatory bodies
- external parties
- customers.

General health, safety and environmental communication requirements for LU are contained in the Manager's Handbook and the LU Category 5 Standard: Health, Safety and Environmental Communication and Consultation.

9.2 Corporate communications - communications with employees

The principal methods of communication with employees rely on centrally developed information being cascaded down through the management levels. Specific information of health, safety and environmental significance is communicated in a variety of ways, including the following:

Health and Safety notice boards

Management teams for each location maintain a dedicated Health and Safety notice board, on which only information relating to health and safety is displayed. The Manager's Handbook outlines what must be included as a minimum on health and safety notice boards which includes the Health, Safety and Environment Policy, the 'General Safety Rules', the 'What's Wrong?' poster, details of significant risks and

controls, a copy of the last Health and Safety Representatives inspection or equivalent and contact details for the SQE Adviser, Occupational Health, local Health & Safety representative and CIRAS.

Additional information includes First Aid arrangements and evacuation procedures and information on relevant immediate changes to operations (this is clearly demarcated from general information).

Where any notices are used as a means of communication these are marked with the date and source and obsolete information is removed. The local management team is responsible for ensuring that the Health and Safety notice boards are kept up to date.

Intranet

LU's intranet is used as a communications medium within the business. It is accessible to the majority of LU employees and ensures that they have access to up-to date information. The TfL HSE Directorate maintains the health, safety and environmental information on the LU intranet site which includes information such as the Safety Certification and Authorisation document and information relating to health, safety and environmental performance. Information on LU's safety standards, documents and guidance are also available through the intranet.

9.3 Other communications mechanisms

The LU Head of Communications is responsible for producing corporate information. This includes information on matters of general interest as well as information of health, safety and environmental importance. Managers are responsible for ensuring information is cascaded to employees in their area.

Local or company-wide communications events are held on an ad-hoc basis if there are significant matters or concerns to address.

Employee surveys

LU carries out an annual survey of employees views (Speak Up) on a wide range of issues, including employee motivation, commitment, line management, etc. The findings are communicated across LU and are used by local managers to identify improvement actions which can be built into future business plans. Targeted surveys are carried out for specific issues as required, e.g. perception of safety culture or the effectiveness of the Performance and Development process.

'On the move'

The organisation's magazine is sent direct to each employee's home address and is available on the LU intranet. It aims to reinforce messages, launch campaigns and communicate current issues, including those relating to health and safety matters.

Induction training

Induction training is provided to all LU employees on joining LU. Basic health and safety information is provided, including the HSE Policy, fire and emergency arrangements and a list of local health and safety representatives. Relevant site-specific induction training/familiarisation is also provided to staff locally as required. Health, safety and

environmental issues can also be discussed in performance and development meetings with managers as detailed in Section 8.

Employee bulletins

Employee bulletins, which usually include key business messages, are emailed to all relevant staff as required. Managers ensure that these are displayed on notice boards to ensure that staff who do not regularly access email are aware of this information. These are also published on the intranet. A weekly update bulletin which features all the main news is circulated to staff via email weekly.

Other mechanisms

A number of other communication mechanisms are used to communicate health and safety issues to employees, including TeamTalk briefings (APD and COO), Centurion Briefing Packs (COO), Safety Hours (APD). Many of these messages are communicated face-to-face and are used differently across the business to fit local needs.

9.4 Communication of operational information

Some of the significant risks associated with the day to day operation of the railway are mitigated by operational communications, for example, on-train announcements and announcements made on stations via the public announcement system to communicate with customers, other LU employees and suppliers/contractors working on the station.

There are also a number of publications that are distributed and maintained by LU Network Services. Those with a bearing on safety are set out below. Where Network Rail or Train Operating Companies information is relevant, this information is included in the appropriate document.

Connect

Connect is London Underground's mobile communications system and is used to communicate information across the entire LU network. Emergency services can also use the Connect system to communicate on the Underground. The radio system allows communication of vital safety information across all aspects of the network during normal and degraded operations.

Traffic Circular

The Traffic Circular is sent to all operational staff, Tube Lines and other suppliers. It communicates the latest available information about aspects of railway operations to operational staff on a weekly basis including timetables and track, signalling and equipment alterations. A distribution list is held by the Network Improvements team and paper copies are sent to Group Station Managers locations and Train Crew depots where managers ensure that staff receive and sign for copies.

To ensure that operational employees have access to the most recent versions of operational publications, the Traffic Circular details the status of these publications, when they were updated and the method used. Publications listed include:

- LU Rule Book

- Defective In Service Instructions
- Line Supplements to the LU Rule Book
- Guide To Switching Traction Current On And Off
- Operational Standards Notices.

Guide to Switching Traction Current On And Off

The Guide to Switching Traction Current On and Off contains normal times and arrangements for switching traction current on and off. Changes to this are noted in the Traffic Circular. Replacement packs are issued to those affected following a significant number of changes being made.

Defective In Service Instructions

The document containing the Defective In Service Instructions (DISI) is a Rule Book publication which sets out actions that Train Operators of each type of Passenger Rolling Stock must take to deal with defects during passenger service. It requires employees to whom it applies, to make themselves familiar with the relevant publication and any subsequent amendments (as with all Rule Books).

Line Supplements

Line Supplements contain information and instructions specific to each line. Line supplements are updated on the intranet and hard copies are reissued when necessary and cost effective.

Working Timetables

Working Timetables set out the train schedule on each line. Train staff receive them on an individual basis from Duty Managers. These are sent directly to Train Crew depots. Station staff have access to a reference copy held by Station Supervisors.

Rule Book – associate publications

The LU Rule Books are supplemented by periodic or special publications as follows:

Engineering Works and Safety Arrangements

The Engineering Works and Safety Arrangements (EWSA) publication contains details of planned work (for the forthcoming week) carried out on or about the track where this may affect others' access requirements, including detailed information on engineering train routes, possessions (including references to possession plans, details on roles and responsibilities, etc), major and minor closures, special current arrangements, etc.. It is distributed on a weekly basis. The target audience include the Track Access Control, Power Control and Service Control teams as well as Protection Masters and station staff. Paper copies are sent to Tube Lines, PFIs, their suppliers and contractors. Protection Masters also receive a copy before booking on with the Track Access Controller and all stations receive copies.

Nightly Engineering Protection Arrangements

The Nightly Engineering Protection Arrangements (NEPA) publication contains relevant information for that nights work, i.e. details of first and last trains,

together with the night concerned traction current switching times. It is published every day and sets out details for the coming night. The target audience is protection staff.

This document was introduced in 2011 to simplify the range of information and target this specifically to those working during engineering hours. It also contains details of specific hazards, such as engineer's trains work sites, asbestos sites and possessions. It is produced for staff undertaking protection activities during engineering hours. The data contained within this publication is derived from the Engineering Works and Safety Arrangements and Engineering Notices. However, it does not contain the level of detail contained in the EWSA.

Engineering Notices

Engineering Notices are issued daily and detail emergency engineering work. For safety and logistical reasons, these are restricted to 2-sides of an A4 sheet of paper – each numbered with the unique number of that day's notice. They are distributed to relevant locations and others affected.

Station Works Plans

Station Works Plans detail work to be undertaken at LU stations and Station Supervisors receive them in paper copy weekly. They also receive daily update plans covering additional approved work not included in the weekly edition.

Timetable Notices

Timetable Notices are issued when there are changes to the Working Timetable, paper copies are sent to Train Crew depots affected and managers ensure Train Operators receive copies.

Operational Standard Notices

Operational Standard Notices (OSN) are used to publish changes to the Rule Book where required. The OSNs are communicated to relevant staff and are published on the intranet.

All of the above are also available on the LU Intranet site.

To ensure that communication of the listed publications is effective, the LU Management System requires appropriate managers/supervisors to ensure:

- employees are aware of publications as soon as possible after receiving them,
- employees are instructed in revised procedures, guidelines, standards etc. and that they understand and follow them,
- employees sign for all printed publications they are issued with and if material is received electronically, an audit trail is developed to prove that employees have received or been made aware of the contents, and
- that up to date copies of publications are available at their stations, depots, signal boxes, control rooms and signalling control centres.

There are also requirements for operational employees to:

- be familiar with publications which affect them
- make sure they are aware of new publications which affect them
- make sure the publications are current
- sign for all publications they are issued with.

9.5 Safety Critical Communications

Requirements for safety critical communications are set in LU's Rule Book 1 Communications. This covers:

- giving and receiving messages including the use of communications protocols
- using communications equipment
- reporting emergencies
- issuing instructions.

The Manager's Handbook requires that centurion level managers undertake monitoring of the effectiveness of safety critical communications and take corrective action where necessary. In addition, the effectiveness of safety critical communications and their management is included within the scope of HSE operations audits carried out as described in Section 11.

9.6 Urgent issues

Specific requirements for the communication of unusual or potentially dangerous occurrences, asset related failures, or failures in safety management causing immediate concern to LU and its suppliers are detailed in the Manager's Handbook. This is done via the quickest means practicable to those responsible. Initial notification may be verbal and written communication issued as soon as practicable to the designated LU, Tube Lines and other Suppliers' HSE/Safety Managers.

The HSE/Safety Managers assess the significance of the information, identify any action required and circulate details to those affected to take the necessary action.

9.7 Communications within the LU group

As infrastructure manager, LU has a responsibility to communicate with other members of the LU Group when health and safety matters impact on them. General requirements regarding communications with the LU group (e.g. following incidents that may affect the health and safety of their employees or on planned changes impacting on health and safety) are detailed in the appropriate Manager's Handbook.

Additionally, the LU Category 1 Standard: Procuring and Managing Suppliers and Contractors – HS&E Requirements requires Tube Lines and other suppliers to provide LU with specific health, safety and environmental related information to ensure LU has adequate knowledge about their health, safety and environmental risks.

As an additional aid to communication, LU and Tube Lines have access to each other's intranets.

9.8 Communication with other railway operators

Communication with other railway operators over corporate issues and safety matters is the responsibility of the National Rail Agreements Team. Communication through the team is complemented by the communication of Network Rail's Regional Weekly Operating Notices which are transmitted electronically by Network Rail to key LU operating staff for information. The LU NOC receives Network Rail alerts on defective equipment. The technical aspects of these notices are reviewed by the Head of Engineering as appropriate and communicated to suppliers where appropriate. Local arrangements for communicating with other railway operators and LU's system for interface/cooperation are described in Section 12.

In the event of an emergency or incident, LU communicates with other railway operators as described in Sections 10.1 and 10.2.

9.9 Communication with regulatory bodies

General requirements for communicating with health, safety and environmental regulators on specific issues are detailed in the Management System. Specific requirements for communicating with these are detailed in the Manager's Handbook and the LU Category 5 Standard: Interfaces with Health, Safety and Environmental Regulators.

Receipt, by any manager, of information of regulatory concern or action from a health, safety and environmental regulator is notified to the appropriate Safety, Quality & Environment Manager (SQEM). The SQEM assesses the significance of the information, takes any required action and circulates to those affected.

9.10 Communication with external parties

The LU Head of Communications and/or the LU Director of Health, Safety and Environment are responsible for communicating with customer bodies. The Director of News at the TfL Press Office is responsible for communicating with the media. The TfL Press Office is notified of any health, safety or environmental matter that is likely to arouse media interest to ensure that the appropriate response is provided.

9.11 Communication with customers

The Director of Strategy and Service Development is responsible for the LU standards which relate to train and station staff communication with customers in line with Customer Service Delivery standards and LU Rule Book. LU also communicates with customers via its Customer Service Centre.

LU carries out a variety of campaigns which aim to provide information to customers. Specific safety campaigns are run which aim to influence customer behaviours to minimise risks that they may be exposed to whilst travelling on the LU network. These campaigns focus on the areas of highest risk.

A range of customer information is available on the TfL website. As well as providing customers with real time service information and news, customers are also able to gain access to specific health and safety information such as this Safety Certification and

Authorisation document and information on health, safety and environment performance.

9.12 Revision history of this section

Revision Number	Date	Changes
V2 (as Version 2.00)	October 2011	Five year renewal of LU's Safety Certificate and Safety Authorisation

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Section 10: Emergency planning, incident response and incident investigation

Contents

10.1 Emergency planning

LU's emergency planning and response process has been designed to ensure that LU manages incidents safely and restores service as soon as practical and as safely possible. LU has had to respond to a variety of internal and external incidents over the past five years. As a result, LU has amended and improved its processes, co-ordination internally and with third parties, training and emergency planning. The information below outlines some of these systems in more detail.

LU's requirements for emergency planning and related arrangements are contained in the Manager's Handbook (Providing emergency, contingency and business continuity and security support) covering:

- emergency preparedness plans
- planning table-top exercises
- planning live emergency exercises
- planning emergency leap frog exercises.

Requirements for managing incidents are set out in the Rule Book: Managing incidents.

LU ensures that its employees are trained and prepared through emergency planning arrangements through specific post and competency requirements, training modules and participation in emergency exercises. Details on training and competence are set out in Section 8 and communication in Section 9.

The Manager's Handbook requires production of emergency plans that define individual roles and responsibilities in degraded and emergency conditions. It also establishes arrangements that provide fast and effective response to all types of incident. Suppliers are required to produce emergency plans through clauses in their contracts.

LU has three levels of emergency plan:

- the LU Network Plan which covers incidents that may affect a number of lines or the entire LU network involving stations and trains, e.g. major power failure, major loss of communications systems, major flooding and terrorist attack
- line plans which cover incidents (stations and trains) that may affect specific lines, and form part of each Service Delivery Unit's emergency plan, e.g. stalled trains or loss of local signalling or power control
- local plans which cover specific locations, e.g. stations, service control centres, train crew depots, e.g. station evacuation due to congestion or local security alert

All emergency plans are integrated and mutually support one another. The findings of the Risk Assessment Process are used to structure the content of these plans, as necessary. Rules dealing with operational emergencies and incidents are documented in the various Rules Books. Where required, third parties, such as TRANSEC (the Department of Transport's Transport Security team), emergency services, large event organisers or other transport undertakings, are involved in the development of LU's emergency plans. This closer working, including joint development of Congestion

Control and Emergency Plans at LU stations, has allowed LU to build more robust and effective emergency plans.

Whilst LU involves the emergency services in exercises in respect of these plans, emergency plans are not, by agreement, routinely provided as they are predominantly for the utilisation of LU staff and managers. However, stations' Fire Compliance Plans are made available to the Fire Service. These plans and the axonometric diagrams show the physical layout and configuration of sub-surface stations including the fire precautions and controls. These plans are maintained by the Access team in the Network Services team.

In the event of an on-train emergency, customers are evacuated by train staff assisted by station staff as appropriate. LU procedures assume that escape is only possible through the end cab doors and a "break glass" cover is provided over the cab door handle accessible from the passenger saloon to facilitate this. All resident station employees are trained to handle emergencies at their station and the stations in the area they cover.

Staff are trained to handle a comprehensive range of emergencies as required by the Rule Books as part of the continuous development training. Managers receive training for dealing with emergencies that are appropriate to their post. All operational employees also undertake fire training. Competence is maintained as set out in Section 8.

LU's mobile communication system (Connect) allows communication across all aspects of the network during normal and degraded operations.

Periodic table-top and live emergency exercises are held to test the effectiveness of emergency plans and their interaction with other agencies, including other transport undertakings. These exercises enable LU to demonstrate its ability to respond to emergencies and review the effectiveness of current arrangements.

Table-top and live testing of emergency plans are carried out in accordance with a rolling programme. These are multi-agency exercises involving the emergency services.

Table-top testing of the LU Network Plan is carried out at least once a year. Line Plans are table-top tested at least once a year with a live exercise also held at least once a year.

Live emergency leap-frog exercises are carried out at least once a year for each Line with One-Person Operated trains in tube tunnel sections (except for those lines with full Automatic Train Operation). Third parties are involved in these exercises where appropriate.

10.2 Incident response

Incidents on the LU network are managed in accordance with emergency planning arrangements (described above). LU has established an incident organisation structure (set out in the LU Rule Book) for incident organisation and management. This defines the roles of all those involved in incident response and sets out the arrangements that are put into place following an incident.

The aim of these arrangements is to safeguard customers and employees by establishing an organisation which will provide fast and effective responses to all types of incident, achieve the objective of incident containment, minimise injury/loss and restore LU operations as quickly as possible.

The Rule Book sets requirements for:

- initial actions following an incident
- co-operation with others, including Tube Lines and its role
- roles, responsibilities and actions
- incident control structure, including a 'gold, silver, bronze' control structure
- preservation of evidence
- additional arrangements in respect of particularly serious or protracted incidents
- special events requiring the implementation of incident control arrangements
- interfaces with Network Rail and other operating companies.

Effective communication is managed through clear identification of responsibilities as set out in the Formal Incident Management system set out in the Rule Book.

A senior LU manager is available on-call at all times to undertake the role of Rostered Duty Officer (RDO). The RDO assumes overall command during an incident and is responsible for formulating the strategy for dealing with the incident and its effects on other LU services outside of the incident site.

Following an incident that requires formal incident organisation, the RDO is contacted by the LU Network Operations Centre (NOC). The NOC acts as the link between the RDO and those directly managing/handling the incident. Where necessary, the NOC also call out the Emergency Response Unit (ERU) and advises the Office of Rail Regulation (ORR) (TfL Team), Rail Accident Investigation Branch (RAIB) and others as appropriate.

The LU Head of Engineering and Tube Lines also maintain rosters of on-call engineering support for incidents in the form of Duty Engineers.

The ERU, managed by Tube Lines, provides emergency response capability across the whole LU network. The provision of this service is managed through the contract with Tube Lines, and specifically the ERU agreement that forms part of the PPP Contract. The equipment that the ERU is required to maintain is listed in the ERU Agreement.

The ERU is available to attend incidents on 24-hour standby basis and is trained to deal with all foreseeable rail related incidents across the LU network. Through mutual aid agreements, the ERU supports Network Rail when incidents occur on its infrastructure. The ERU is also contractually obliged to partake in a minimum of one live emergency exercise per year.

For incidents involving other infrastructure managers and train operating companies (either on or adjacent to other infrastructure), TfL/LU employees work jointly with other relevant organisations to deal with the initial incident and investigation. If an incident

occurs on Network Rail property, then the Network Rail Emergency Plan comes into operation.

10.3 Incident recovery

For incidents that require significant or protracted recovery arrangements outside the scope of the incident organisation, LU has established an emergency recovery process within the LU Network Plan. Once such an incident has been dealt with via the arrangements for incident organisation described above, the Emergency Recovery Process is initiated via the relevant Line General Manager working with the Emergency Planning Manager. In the event that the impact of the incident has implications beyond the Line, the Duty Director is notified in order to initiate the recovery process at network level.

Where it is established that an emergency recovery response team is required, this is established by the relevant senior manager in conjunction with the Emergency Planning Manager. The extent of the arrangements and composition of the team reflects the nature and scale of the incident. Those involved act as the link between the team and their area of LU that is providing recovery support. The role of the team is to assess what is required in order to return LU lines or network services to normal operation, and developing the arrangements to achieve this including priorities, strategy, funding requirements and additional resourcing needs.

The requirements for undertaking a post-incident assessment and developing and delivering the recovery plan are embodied in the LU Network Plan.

10.4 Incident reporting and investigation

Incident reporting and investigation requirements are set out in the Manager's Handbook, supported by the following LU HSEMS Standards:

- Category 1 HSEMS Standard: Incident Reporting and Investigation: this sets requirements for LU and its suppliers
- Category 1 HSEMS Standard: Formal Investigation of Incidents
- Category 5 HSEMS Standard: Incident Reporting and Local Investigation.

10.4.1 Incident reporting

Requirements for incident reporting cover:

- ensuring that employees, contractors and others are aware of the need to report incidents
- reporting arrangements for different types of incident
- the need to notify employee health and safety representatives and, where necessary, other operators and ORR (TfL Team)/RAIB
- safety alerts that require urgent communication
- standard reporting forms and their distribution
- additional incident records for specific incident types such as staff assaults and Signals Passed At Danger
- record keeping
- confidential reporting systems.

The standards also define the roles and responsibilities of those involved in the reporting of incidents.

All recorded safety related incidents are entered onto the LU Safety and Environmental Analysis (LUSEA) and electronic Incident Reporting systems. These systems are maintained and managed by the HSE Directorate and are used to undertake the analysis of incidents and incident types. HSE produces weekly, periodic and quarterly Safety Performance Reports which includes trend analysis in respect of incidents and incident types. This data is also a valuable input to the development and review of risk assessments, assurance planning and performance review. This information is also used in delivering safety improvement plans (Section 6.5).

LU incidents which occur on Network Rail infrastructure are logged on the RSSB's Safety Management Information System.

10.4.2 Incident investigation

The purpose of incident investigation is to identify root causes in order to ensure appropriate corrective action is taken to minimise the risk of recurrence and improve health, safety and environmental management. LU's experiences in incident investigation and outputs from RAIB investigations have resulted in improved incident investigation procedures (e.g. improved training, clearer accountabilities for those involved in investigations), closer working with the RAIB where appropriate and more robust and thorough Formal Investigation Reports. Where investigations identify the need for further improvements (either in the process or output), improvements are incorporated into local or strategic improvement plans (Section 6.5).

The LU Category 1 and Category 5 HSEMS Standards for incident reporting and investigation (outlined above) define the requirements for both reporting of incidents and what is required for both formal and local investigations. For incidents that do not require a designated Formal Investigation, a local investigation is undertaken. The standard for local investigations requires:

- thorough and timely investigations
- establishing appropriate terms of reference for the investigation
- investigations by suitably competent and experienced persons
- the involvement of health and safety representatives
- the involvement of any specialist advisers that may be required
- the identification of causal factors including root causes
- required actions and the arrangements for their implementation and monitoring
- communication of key findings to interested parties across LU and its suppliers.

Local investigations are normally commissioned by the local accountable manager for the area where the incident occurred. This manager is responsible for ensuring that the above requirements are achieved.

Where an incident occurs on Network Rail infrastructure, LU complies with the relevant Railway Group Standard.

The LU Category 1 HSEMS Standard: Formal Investigations defines the types of incident that require a formal investigation. The standard outlines:

- who may commission a FIR – this is limited to directors and senior operational managers
- responsibilities and actions required to be taken by the commissioning director/manager at each stage of the investigation
- establishing competence requirements including the appointment of an investigation leader and trained investigator
- the involvement of Health and Safety Representatives in the investigation
- reporting arrangements including review arrangements and agreeing the final report, recommendations and action
- report issue and the monitoring of actions through to completion.

The LU Category 1 Standard: Formal Investigation requires that the HSE Directorate establishes the competence requirements for incident investigators and ensures that competent resources are appointed. This is achieved through the selection of a number of suitably competent LU employees against set criteria and provision of specialist investigation training in order that every Formal Investigation has a fully competent investigator allocated to it. Ongoing competence is maintained through ensuring HSE Lead Investigator attend appropriate RAIB training courses and experience of leading formal investigations and coaching colleagues in lead investigation techniques. The HSE Directorate has also established arrangements which ensure that a trained investigator is on call at all times throughout the year.

Once the investigation is completed and the draft Formal Investigation Report (FIR) is prepared, the commissioning manager submits the report to the LU Directors' Risk, Assurance and Change Control Team (DRACCT) for peer review and acceptance of the report, actions time scales and allocation of accountable managers.

The commissioning manager may only close the investigation when:

- DRACCT has confirmed that the terms of reference (including verification activities) for the investigation have been met
- recommendations and actions are clearly defined, have accountable managers assigned to them and have agreed completion dates
- the report and recommendations have been accepted by the LU DRACCT
- recommendations have been entered on The Plan.

For particularly significant incidents, the FIR may also be submitted to the Rail and Underground Board for review. At the discretion of the Board, regular reports on progress with the implementation of the recommendations may be requested.

Once finalised, the FIR is circulated to relevant staff, shared with Tube Lines and placed on the intranet. Where appropriate, specific recommendations for sharing of lessons learnt are included in the FIR.

Submission and review of FIRs by Directors and senior managers at DRACCT ensures that high quality FIRs are produced. The HSE Directorate also carries out ad hoc reviews of FIRs to ensure that the investigations and reports meet the standard required.

All RAIB or ORR reports/recommendations on LU or Tube Lines incidents are reviewed at DRACCT and, if requested, by the directors at the Rail and Underground Board. Where appropriate, actions are agreed, timescales set and accountable managers defined. These actions are entered on The Plan and tracked according to The Plan governance processes. Once completed, formal closure is requested through the ORR.

10.4.3 Notifying regulators

LU's Category 5 HSEMS Standard: Incident Reporting and Immediate Investigation sets out the requirements for notifying the ORR (TfL Team) and RAIB of incidents in order to comply with the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) and the Railways (Accident Investigation and Reporting) Regulations.

10.4.4 External incidents

LU has established arrangements for the review of reports of significant incidents which occur outside LU and the development of an appropriate LU response. This includes ORR and RAIB reports, and also any safety incident that might have a bearing on LU's arrangements or operations.

The focal point for such reports is the HSE Lead Investigator, who undertakes an initial review and evaluation in order to establish the potential implications for LU and to identify who within LU or its main suppliers needs to receive a copy of the report and undertake a more detailed review and, where required, develop improvement actions.

Responses or action plans are co-ordinated by the HSE Lead Investigator who also arranges for appropriate peer review via DRACCT. Agreed actions are entered onto and monitored via The Plan governance process.

10.5 Revision history of this section

Revision Number	Date	Changes
V2 (as Version 2.00)	October 2011	Five year renewal of LU's Safety Certificate and Safety Authorisation

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Section 11: Safety/technical audit and review

Contents

11.1 Overview

Within LU's safety and technical assurance regime, audit is an important means of establishing the level of compliance with requirements. LU maintains safety and technical audit programmes in order to provide comprehensive compliance evidence that health and safety risks are being controlled and that safety and technical assurance and self-assurance arrangements are working effectively.

LU plans and undertakes internal audits (LU Group) and audits of external suppliers to TfL.

The main activities within the audit process are set out in the Manager's Handbook: Providing legal support, governance and audit handbook. The detailed requirements are set out in the Audit Process Work Instruction which is published on the audit Management System pages of the LU intranet. This Work Instruction includes identification of auditing requirements and the planning of audits, through to the structured collection of evidence and information on the efficiency, effectiveness and reliability of systems for managing health and safety. It also covers monitoring and review of plans for corrective action. The structure of LU's auditing arrangements allows for the audit of the complete management cycle for managing safety.

11.2 Safety and technical audit processes

The safety and technical audit processes have been designed to ensure the principle of independence is maintained for all activities. The LU HSE Policy, Management System requirements and work instructions for safety and technical audit are set out in the LU Management System. This includes processes to ensure auditor competence and independence.

11.3 Safety and technical audit planning

The LU HSE Audit Manager is responsible for developing a combined safety and technical audit programme on an annual basis. The audits included within the programme feature a combination of the different audit types. The combination and content of audits carried out each year is determined by consideration of the following factors:

- business performance (including periodic and quarterly performance scorecards)
- Verification and Change Assurance Plans
- changes in the LU Quantified Risk Assessment (QRA)
- changes in Active Risk Manager (ARM) (LU's business risk register)
- findings of internal and external audit reports, incident investigations and other regulatory activity
- outputs from LU, Transport for London and Tube Lines audit programmes
- changes in the risk registers managed by each Programme Board.

Draft annual audit programmes are prepared for each fiscal year. The programme, which addresses activities where there is evidence that risks are poorly managed or controlled, is subject to consultation within the LU group to ensure the balance and

extent of the proposed programme reflects confidence levels within the Group. When the consultation process ends, a draft programme is prepared for approval at the Health, Safety, Environment and Climate Change Programme Board. Quarterly progress reports on audits carried out are circulated within LU via the quarterly HSE Performance Report.

11.4 Audit reports and response requirements

Audit reports are issued following the completion of all safety and technical audits carried out. Auditees are required to respond to audits within a defined timescale. Responses are required to be in the form of an action plan detailing:

- action to be taken in respect of each audit finding or recommendation
- the manager accountable for implementing the action
- the agreed completion date for the action.

The Audit Client[2] is responsible for ensuring that actions are monitored through to completion. Progress on or completion of actions is considered as part of the audit programme planning process. Follow up audits are carried out where the completion of actions is considered safety significant. Audit considers the effectiveness of local action tracking and completion and following up of agreed actions on a risk basis. Progress is reported at directorate level on an exception basis.

Where an audit identifies the need for improvements to the Management System, including HSEMS elements of the Management System, the necessary change is proposed via LU's change management process (Section 7). The proposed change is reviewed via DRACCT for significant changes and via DRACCT nominees for changes of lesser impact. If approved, the necessary changes are made to the Management System.

11.5 External audits of LU

LU is subject to audit by ORR, other regulatory authorities and TfL Audit on occasion. LU is committed to full co-operation with the requirements of such bodies. This is facilitated through the Head of HSE Systems, Standards and Audit.

11.6 Review of the LU HSE arrangements

LU's Management System review arrangements enable monitoring and decision-making about the adequacy of health, safety and environmental management arrangements and allow decisions about the nature and timing of necessary actions to remedy deficiencies and effect improvements. The highest level of review takes place at the Rail and Underground Board.

Through arrangements for review, LU ensures that compliance with, and continued effectiveness of, the Management System is reviewed, identifying improvement actions where appropriate.

[2] The audit process was changed in 2011 to make the Audit Client, rather than the Audit team, responsible for monitoring of actions. This is to ensure that the accountability for improvements lay with a relevant accountable manager. This change was introduced via the change control process described in Section 7.

In order to ensure that the LU arrangements for HSE management remain adequate and effective over time, LU has implemented an LU Category 1 standard: Review of the Health, Safety and Environmental Management System. This standard establishes requirements on LU and its suppliers in respect of the scope of such review and how the results of reviews are utilised in order to achieve improvements. In broad terms, but subject to risk based priorities, all components of LU's Health, Safety and Environment Management System are reviewed on a rolling 3 year period.

LU has identified the key elements of arrangements that need to be the subject of thorough review and these are set out below. These arrangements ensure that the review has visibility at Board level.

11.7 Key elements of review

The following key elements are subject to assessment as part of the process for review:

- compliance with and the suitability of the Health, Safety and Environmental Policy
- the validity of risk assessments and control measures
- performance against targets and objectives including the LU Safety Improvement Plan
- the effectiveness of the Management System in respect of HSE arrangements
- the effectiveness of the communication of health, safety and environmental information
- the implications of new or changed legislation and how requirements will be complied with
- on-going compliance with legislation and best practice
- the suitability of competency and training arrangements
- the effectiveness of previous corrective actions.

11.8 Means of review

Section 2 described the governance and management arrangements for HSE within LU. It summarised the respective roles of those bodies which have a significant role in periodic and on-going review activities such as the LU Health, Safety, Environmental and Climate Change Programme Board (HSECC) and the LU Director's Risk, Assurance and Change Control Team (DRACCT). The roles of these boards are defined within their respective terms of reference and those HSEMS Standards which place requirements on these bodies. In addition to the periodic review described above, LU undertakes review activities when the need is identified as the result of:

- audit findings
- achievement of safety performance targets/objectives
- changes to internal or external standards
- developments in best practice and technology
- changes in policy
- organisational change
- changes to legislation
- risk assessments

- incidents/incident investigations.

11.9 Actions as the result of HSE review activities

The results of significant HSE review activities are recorded and the actions required determined accordingly. This may include actions being incorporated in the LU Safety Improvement Plan/The Plan for the most significant items or else included in lower level action plans as part of local improvement monitoring. Sections 2 and 13 set out more fully LU's HSE monitoring and assurance arrangements.

11.10 Revision history of this section

Revision Number	Date	Changes
V2 (as Version 2.00)	October 2011	Five year renewal of LU's Safety Certificate and Safety Authorisation

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Section 12: Interfaces and cooperation

Contents

12.1 Overview

LU needs to interface and cooperate with a great number of external companies and organisations in order to provide its services. These can be grouped into four distinct categories:

- the LU Group,
- other transport undertakings (train operating companies and infrastructure managers),
- other agencies, and
- other suppliers.

The most significant interfaces and control mechanisms are shown in Figure 12.1 below and discussed in greater detail in the remainder of this section.

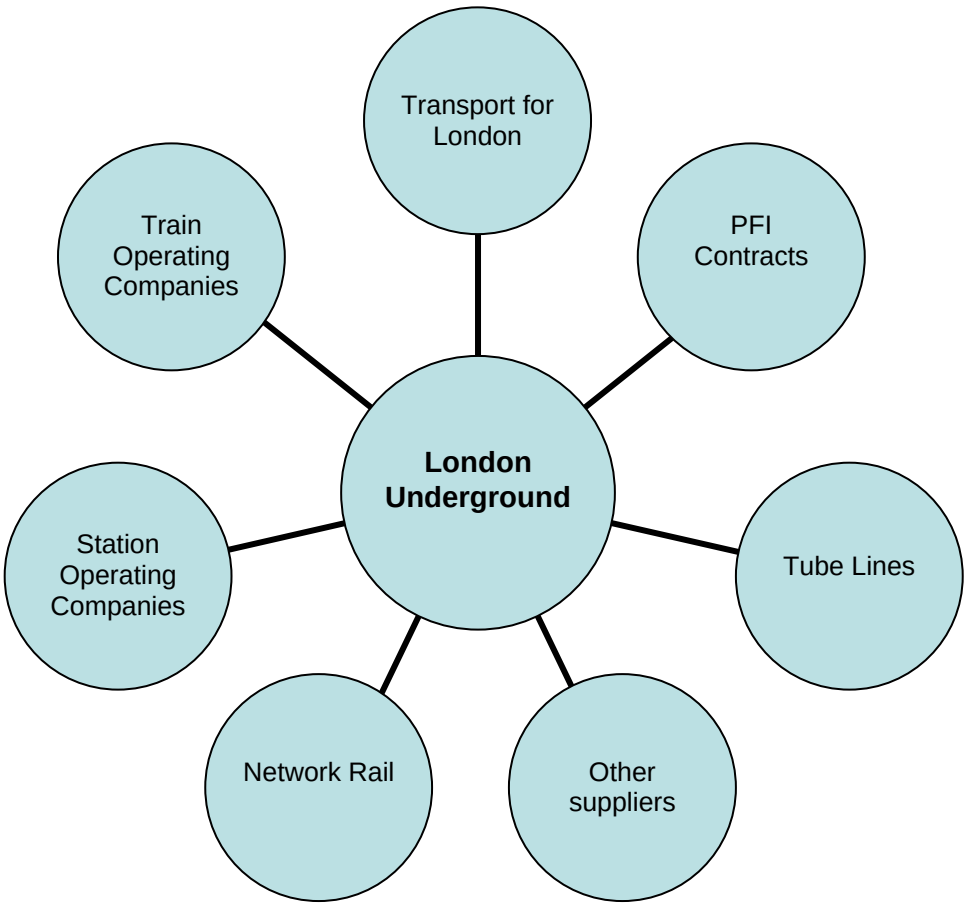

Figure 12.1 Key interfaces and control mechanisms

Other suppliers include suppliers other than Tube Lines and PFI contractors who have a direct contractual relationship with LU. Supplier provide different services – some of which interface with the railway and others that have a limited/no direct interface with the operational railway e.g. supply of Oyster Card vending machines.

LU's Health, Safety and Environment Policy contains a commitment to ensure the contractual arrangements with private sector partners and others promote continuously

improving standards of health and safety performance. LU contracts and agreements are designed to ensure that:

- there are clear expectations and obligations on LU and other organisations
- there is a consistent approach between organisations can be taken where necessary
- other organisations are free to maintain assets and deliver continuous improvement to asset capability and reliability, whilst LU retains accountability for asset condition and control
- appropriate mechanisms have been established within all contracts and agreements with suppliers and other operators to ensure that there are effective means of resolving disputes
- all organisations are given the certainty to plan the delivery of their services in an effective and efficient way
- services can be changed in response to customer demand and expectations
- successor organisations can take over the delivery of the services in such a way that there is no interruption to operations and LU can deliver a consistent network-wide customer service.

Through effective co-operation and contract management, including the pro-active handling of risks associated with differing regulatory regimes in the case of LU's National Rail partners, LU ensures that it, other LU group members, Network Rail, other train operating companies, other suppliers and their suppliers are able to fulfil their respective obligations to provide services safely and reliably.

The above arrangements are underpinned by regular liaison and meeting schedules as appropriate to the particular interface along with arrangements for responding to incidents and ad-hoc requirements. At an operational level, this also facilitates the local sharing of information and plans.

The most significant groups of meetings in respect of LU's interfaces are:

- the operational liaison meetings between LU operational managers and their counterparts in other transport undertakings where day to day health and safety management matters are addressed
- the partnership and contractual meetings between LU and suppliers
- the meetings between LU and regulators, such as the Office of Rail Regulation (ORR) and London Fire and Emergency Planning Authority (LFEPA).

The key areas where LU's HSE management arrangements set requirements in respect of co-operation with those parties are:

- interface risk assessment and control
- emergency planning and incident response
- incident reporting and investigation
- change management
- health and safety communications.

12.2 Interfaces - the LU group

The LU group comprises LU, Tube Lines, PFI suppliers and other suppliers that contribute to the maintenance, improvement and operation of assets that are part of, or interface with, the operational railway. These partners potentially have a significant impact on system risk. LU also receives property management and development services from TfL.

An overview of the role and activities of each is provided below (Figure 12.2). The information below also provides further details on the systems that are used to regulate activities to control any imported risk.

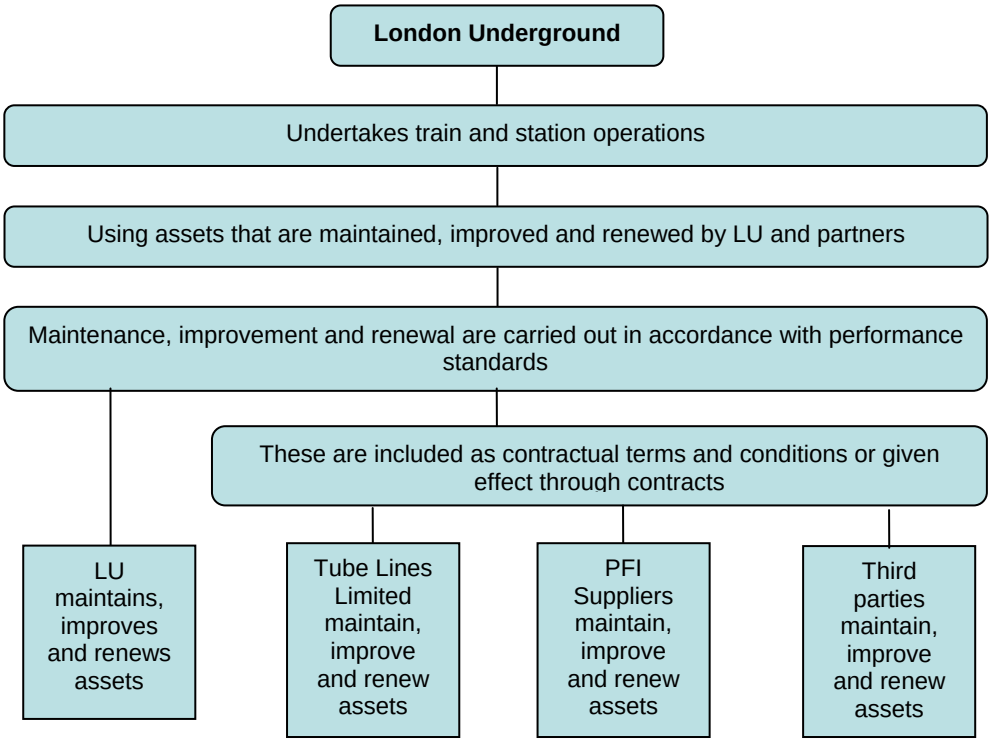

Figure 12.2 Responsibilities of LU Group members

Because of their impact on system risk, co-operation with these parties is essential to ensure identification of hazards and assessment of risk. Details on asset design and maintenance are set out in Section 13.

12.3 Interfaces with PPP supplier – Tube Lines

LU entered a PPP contract with Tube Lines in 2002. In 2010 TfL purchased Tube Lines and Tube Lines is now a subsidiary of Transport for London. It is wholly owned by TfL, but remains a separate legal entity (Section 2.2.1). As the PPP supplier for the Jubilee, Northern and Piccadilly portion of the network, Tube Lines maintains, renews and improves trains, stations and railway infrastructure on the LU network under the PPP Contract. Tube Lines is responsible for assets on the Jubilee, Northern and Piccadilly (JNP) lines and for TransPlant which is an engineering train operator. The terms under which these assets are maintained, renewed and improved are set out in the PPP Contract. TransPlant has a Safety Certificate (issued by the ORR) which is valid until

June 2013. The responsibility for managing TransPlant, including provision of relevant health and safety documentation, was transferred to Tube Lines under the PPP contract. This responsibility remains with Tube Lines now it is a subsidiary of TfL. This includes the requirements for a Safety Certificate as required by the Railways and Other Guided Transport Systems (Safety) Regulations. TransPlant operates across the entire LU network. Where tracks that belong to two separate lines run parallel to each other, responsibility is clearly designated to either LU or Tube Lines.

The only exceptions to the above are the JNP assets maintained by the PFI Suppliers, a limited number of alternative suppliers and Network Rail.

A map showing the extent of LU's and Tube Lines' maintenance responsibilities are contained in Annex 1B. Further detail about the extent of Tube Lines' maintenance responsibilities is contained in the Property Schedules and Plans. These are maintained by the LU Head of External Works Engineering in conjunction with LU solicitors. These show the areas of property that the Asset Performance Director or Tube Lines is responsible for maintaining as well as the boundaries between LU, Tube Lines, the PFI suppliers and other third party operators.

Tube Lines' responsibilities for controlling of significant risks on the LU network are set out in the PPP contract. More details on LU's role in ensuring that Tube Lines fulfils its responsibilities as well as the safety management and risk control systems are set out in Section 13.

LU interfaces with Tube Lines across all levels in the organisation. The Tube Lines Chief Executive Officer reports to the Rail and Underground Managing Director and sits on the Rail and Underground Board. The Tube Lines Chief Executive Officer and Tube Lines Director of Safety sit on the LU Health, Safety, Environment and Climate Change Programme Board. LU works closely with Tube Lines in reviewing performance, sharing good practice and investigating poor performance/incidents. LU also works closely with Tube Lines through other working groups, e.g. the Risk Assessment Forum (RAF) mentioned in Section 4.

12.4 Interfaces with PFI suppliers

LU has contracts with a number of PFI Suppliers. However, only three have an interface with the operational railway. These PFI Suppliers are contracted to install or improve certain assets across the LU network and then maintain them for a fixed period. The PFI Suppliers are: UK Power Networks Services Powerlink Ltd, Citylink and Alstom.

UK Power Networks Services Powerlink Ltd is contracted to operate, maintain and renew LU's power distribution system. The exceptions to this are the power systems between Putney Bridge and Wimbledon on the District line, the Richmond Branch on the District Line, the Bakerloo Line north of Queens Park and on the Waterloo & City line where LU has contracted the power supply to Network Rail.

Citylink is a consortium of private sector companies brought together to provide an integrated communications system across the LU network, including one that interfaces with the emergency services. This communications system is known as Connect. This involves updating existing communications system with a high-capacity fibre optic data transmission network that connects operational and non-operational premises.

Alstom Transport Limited is responsible for maintaining rolling stock, in-cab OPO CCTV equipment used on the Northern line and for maintaining Morden and Golders Green depots. This contract is managed by Tube Lines. Alstom is obliged to comply with the relevant LU Category 1 standards included in the contract.

As with other suppliers, LU's Category 1 standards impose responsibilities on the PFI Suppliers to control significant risks. Regular contract meetings are held where safety, quality and environmental performance matters are reviewed. The PFI teams are actively supported by an LU Health, Safety and Environment Adviser.

12.5 Interfaces with other suppliers

LU has contracts with a number of third party suppliers to maintain, improve and renew LU assets. Contracts range from small maintenance activities, e.g. bridge painting, to large scale station redevelopment projects, e.g. the upgrade of Victoria station. Deliverables are set out in contracts and all LU suppliers are required to meet the requirements set out in LU Category 1 standard. Regular LU-supplier contract meetings are held where safety, quality and environmental performance matters are reviewed. The project teams are actively supported by an LU Health, Safety and Environment Adviser. LU also interfaces with TfL suppliers, e.g. for the provision of the pan-TfL ticketing system, Oyster.

12.6 Interfaces - other transport undertakings and infrastructure managers

As part of the overall transport system for Greater London, LU has a number of physical interfaces with other infrastructure managers and train operating companies (TOCs). These interfaces seek to provide customers with easy access to National Rail services and include:

- other operators operating over LU infrastructure
- LU operating over infrastructure controlled by another infrastructure manager
- parallel running with another infrastructure manager
- LU use of another operator's stations and vice versa.

Tables 1 and 2 in Annex 1C identify stations where other operators interface with LU's stations and stations operated by other operators which are served by an LU train service.

LU's interfaces with other railway operators are managed through the LU's National Rail Agreements team on a corporate level. Local interface management is the responsibility of the relevant Group Station Manager or Train Operations Manager.

The role of the National Rail Agreements team is to ensure that agreements between LU, Train Operating Companies and National Rail parties are effectively managed. Where changes to LU assets are instigated by LU, which may export risk to Network Rail or TOCs, these changes are communicated to Network Rail or the relevant TOC via LU's National Rail Agreements team. LU's change management process is outlined in Section 7. This team also acts as the first point of contact for Network Rail or TOCs when their changes are likely to impact on LU's activities. Agreements made in certain

instances with other operators are also managed by the National Rail Agreements team. These agreements take various forms which involves ensuring that:

- track, station and infrastructure services bought in from or supplied to Network Rail or Train Operating Companies are provided as contractually specified
- track, station and infrastructure services bought in from or supplied to the national rail network are managed to operate safely, effectively and deliver improved performance
- the services provided from National Rail network parties are safe
- the risks allocated within the framework of agreements between the parties are managed correctly and remain in line with that allocation
- interfaces between LU and the National Rail network are identified and interface risks are identified, understood, allocated and managed
- agreement where LU supplies similar track and station services to Train Operating Companies or Network Rail are managed effectively.

The National Rail Agreements team operates by:

- developing and maintaining contracts with all national network parties for which there is a commercial relationship
- supporting the day to day performance of the safety, commercial and operational interfaces between LU, Tube Lines and the national rail companies where LU services operate over national rail infrastructure and where Train Operating Companies operate over LU infrastructure
- providing a support service addressing performance issues or impacts which arise at the network boundaries
- managing the processes of generating, reviewing, renewing and updating agreements and arrangements with national network parties
- working with other TfL bodies, such as DLR and London Overground, to provide similar contractual relationships as those to national network parties.

12.7 Managing National Rail Agreements

The National Rail Agreements framework of Agreements has the following elements:

- statutory and legal vesting provisions that impose duties on LU and other railway operators
- track and station agreements that provide access for LU over Network Rail infrastructure or other rail operators access over LU infrastructure. These include provisions for:
    - safe operation
    - compliance with LU or Railway Group Standards
    - changes to legislation
    - a performance regime with incentives (where applicable).
- the LT/BR Works Access Agreement 1964 which provides for access to and maintenance of infrastructure at the national network interfaces to applicable safety and engineering standards

- Site Specific Engineering Arrangements that describe the boundaries between LU and Network Rail in terms of ownership of property and fixed assets and state the maintenance and safety obligations arising for each asset
- the LU protocol for works that reaffirms both parties' commitment to work safely, to minimise the risk of loss to the other party as a consequence of works and to maximise business and customer benefits through co-operation
- the LU/Department for Transport (DfT) Memorandum of Understanding that provides for the DfT to consult with LU whenever there is a change to a train operating company franchise so that the safety, commercial and operational implications for LU can be reviewed and commented on.

Each Agreement between National Rail network parties and LU is specific as to the infrastructure involved, the services provided and the contracts used for authority to manage processes arising. Track Agreements include a map of the route and definitions of routes, crossovers, sidings and reversing points, which may be used. At station interfaces, the exclusive and shared facilities and services are detailed in the schedules to the Station Agreements. They are included in the schedules to the Station Agreements. This enables risks to be quantified and understood. Accountabilities for providing specified services and for maintaining the infrastructure can be identified.

All of these interfaces have an impact on LU operations and significant risks. Therefore, LU liaises with relevant operators when conducting the relevant risk assessments. Further details on LU's risk assessment process is set out in Section 4. LU's process for managing the impact of proposed changes is set out in Section 7.

12.8 Use of LU infrastructure by other operators

Chiltern Railways operate trains from north of Amersham to south of Harrow-on-the-Hill in accordance with:

- the Track Agreement between London Underground and the Chiltern Railway Company Limited entitled "Agreement relating to payment of charges for the provision of track access between Harrow-on-the-Hill and Amersham"
- LU Rule Books
- Chiltern Railways Safety Certification,
- relevant LUL engineering standards
- Metropolitan Line supplement to the LU Rule Book.

South West Trains operate between Wimbledon Station and East Putney Station (principally for empty stock moves) in accordance with:

- the Track Agreement between the London Underground and Network Rail entitled "Track agreement East Putney - Wimbledon (District Line)"
- South West Trains Safety Certification
- the collateral warranty between London Underground and South West Trains Ltd
- the Network Rail modular rulebook

- LUL Wimbledon to East Putney Local Operational Arrangement dated August 2003 and signed by London Underground and Network Rail for the operation of the interface and common areas on the line of the route.

The following train operating companies operate engineering trains over the LU network:

- TransPlant: the train operating division of Tube Lines which operates over the entire LU network, apart from the Waterloo & City Line, for maintenance and train testing purposes
- Colas Rail Ltd: operates over the East Putney to Wimbledon Branch for maintenance purposes
- GB Railfleet (part of Europorte): operates engineering trains on behalf of the LUL Capital Programmes Directorate for Ballasted Track Renewals on the District and Metropolitan Lines, in possessions only
- DB Schenker: operates the water jetting train between Amersham and Harrow on the Hill
- Chiltern Railways: provide back up water jetting services between Amersham and Harrow on the Hill.

Before these companies can operate on LU infrastructure, LU reviews their applications for Certification/Authorisation (as appropriate) and makes representations to the ORR. LU also ensures that vehicle approvals are undertaken in accordance with LU standards. This approvals process assesses the third party operators train protection systems. Operations are carried out in accordance with the arrangements outlined above.

12.9 LU operations over Network Rail infrastructure

LU's operates over Network Rail in a number of locations. Operations from Gunnersbury to Richmond and Queen's Park to Harrow and Wealdstone, which take place over Network Rail infrastructure, are undertaken in accordance with:

- the Track Agreements between LU and Network Rail entitled Track Agreement T03 (un-regulated) between Network Rail Infrastructure Ltd and London Underground relating to LU Bakerloo Line services – Queen's Park/Harrow & Wealdstone and Track Agreement T04 (un-regulated) between Network Rail infrastructure Limited and London Underground relating to LU District Line services – Gunnersbury/Richmond
- Network Rail's Track Access Standards, known as the Network Code
- a valid Safety Authorisation / Safety Certificate
- relevant Network Rail and where appropriate, LU standards.

Engineering acceptance of LU's vehicles over Network Rail Infrastructure is in accordance with Railway Group Standards. LU station staff do not have safety critical track responsibilities in respect of Network Rail infrastructure.

As well as LU operations which run over Network Rail infrastructure, at the locations identified above, there are a number of interfaces where LU trains run parallel with Network Rail infrastructure. These are between:

- Campbell Road junction and Upminster on the District line
- Finchley Road and south of Harrow-on-the-Hill on the Metropolitan line
- Paddington (Suburban) station and Westbourne Park on the Hammersmith & City line
- Wimbledon and north of Wimbledon (alongside the South West Trains Wimbledon Train Care depot) on the District Line
- Kensington (Olympia) and west of Earl's Court on the District Line
- West Brompton and west of West Brompton on the District Line
- West of North Acton and Ealing Broadway on the Central line
- East of North Acton and West Ruislip on the Central line
- Stratford and Canning Town on the Jubilee line.

LU also has further interfaces with Network Rail where LU is the infrastructure manager. These are between East Putney and Wimbledon on the District line, where Network Rail operate the signals and provide the power supply, and on the Waterloo & City line where Network Rail provides the power supply. These interfaces are managed by contracts between Network Rail and LU.

The map in Annex 1B shows the extent of LU and Network Rail's maintenance responsibilities.

12.10 LU's use of other operators' stations

LU services call at a number of stations where the infrastructure is managed by others. These include:

- London Overground Rail Operations Limited (LOROL): manages Willesden Junction and Kilburn High Road (LU uses the latter for non-passenger moves only) on the Bakerloo line and Kensington (Olympia) on the District line
- c2c: manages Barking and Upminster stations on the District line
- South West Trains which operate Wimbledon and Richmond stations on the District line
- Heathrow Express Operations Company Ltd: manages Heathrow Terminal 5.

LU has a number of management arrangements with other operators in place for stations, including:

- Stratford station: two of LU's Central Line platforms are situated on part of the station operated by National Express East Anglia and the remainder are on LU-owned lease area – a Local Operating Agreement is in place
- Ealing Broadway: LU owns the platforms which service the District and Central lines and pays First Great Western for staffing of shared areas
- Network Rail stations: LU is the Station Facility Owner at 14 stations in a regulated agreement with Network Rail. This involves operation and light maintenance at the following stations: Harrow & Wealdstone, Kenton, South Kenton, North Wembley, Wembley Central, Stonebridge Park, Harlesden, Kensal Green, Queens Park, Kew Gardens, Gunnersbury and the parts of the station serves by LOROL at Highbury & Islington,

Blackhorse Road and West Brompton. At these last 3 stations, LUL owns or has long term lease for the remainder of the station
- Train Operating Companies have access agreements with LU to use the stations and in the case of Wembley Central & Highbury and Islington provide staff to assist their own customers, for at least part of the day.

LU has established arrangements to manage the risks where stations:

- contain another infrastructure manager's infrastructure
- are linked to another station operators station
- share access with another station operators station
- share a common site with another station operator. [Note: On the LU network, this is often when LU operates a sub-surface or Tube station that is underneath a NR/TOC/DLR/LOROL station.]

At sites where other operators have responsibilities to ensure the safety of LU services, information about how these interfaces are managed is contained in their HSE arrangements.

Where LU assets are located on Network Rail's or another operator's station, LU maintenance responsibilities are shown on their station plans.

12.11 Other operational interfaces

London Underground has operational interfaces with London Rail services in the following locations:

- with Rail for London Limited as the Infrastructure Manager for the East London Line and London Overground Rail Operations Ltd (LOROL) as the Train Operator at Whitechapel and Canada Water stations
- the Docklands Light Railway (DLR) at Bank, Canning Town, Stratford and West Ham stations. DLR is the railway and the infrastructure manager. SERCO Docklands is the train operator for DLR. At these stations, SERCO Docklands staff operate the part of the station that serves its infrastructure. However, LU has overall responsibility for station control and for some maintenance of the DLR platforms (e.g. lighting and power).

There are operational interfaces with First Capital Connect at Farringdon, Kentish Town, King's Cross St. Pancras, Highbury & Islington, Finsbury Park, Moorgate and Old Street.

LU interfaces with the Network Rail-sponsored Thameslink project at Farringdon and Blackfriars stations.

LU works closely with Crossrail in delivery of Crossrail infrastructure on or close to LU infrastructure to ensure the successful build of Crossrail. LU will operate as the Infrastructure Manager and the Station Operator for a number of Crossrail stations in central London when they are delivered in early 2018. The LU Crossrail team works closely with the relevant Crossrail teams to ensure that all infrastructure which will become LU's responsibility meets appropriate standards and legislative requirements. This is delivered through the relevant LU assurance arrangements (Section 13.7).

12.12 Interfaces - other agencies

As part of the overall transport strategy for London, LU liaises with a number of agencies including enforcement bodies, local authorities, British Transport Police and London Bus Services Limited.

LU liaises with enforcement bodies and local authorities over safety concerns, when planning for special events and when conducting table-top exercises.

LU has an agreement with British Transport Police (BTP) for the provision of police services to the Underground to ensure the security of the LU network and reduce crime. This service is provided through dedicated BTP units.

LU interfaces with London Bus Services Limited (LBSL) on a daily basis as part of its role in providing an integrated transport system for London. There are a number of bus stations located adjacent to LU stations. LBSL carries LU customers in the event of severe disruption to services, unplanned line or station closures and planned line or station closures.

In the event of service disruption and unplanned line or station closures, the LU Network Operations Centre liaises with LBSL's 24 hour Emergency and Communication Centre.

12.13 Revision history of this section

Revision Number	Date	Changes
V2 (as Version 2.00)	October 2011	Five year renewal of LU's Safety Certificate and Safety Authorisation

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Section 13: Design and maintenance of the LU network

Contents

13.1 Overview

As outlined in Section 1, the design and maintenance of LU's assets is undertaken by the LU Capital Programmes Director and Asset Performance Director respectively, or has been contracted to Tube Lines, PFI and other suppliers. LU manages the maintenance and improvement of assets by means of:

- LU's Management System, including the Project Management Framework, Asset Management System and LU's Standards Regime (Section 2)
- the contractual arrangements described below which establish LU's requirements including the requirement to comply with LU's design and maintenance standards and the means of incentivising supplier performance and enforcing compliance where necessary
- LU's assurance regime which ensures compliance with design and maintenance requirements.

Asset design and maintenance activities are delivered by LU and by suppliers. Relationships with suppliers are set out in Section 12. Clear accountabilities and scope of responsibilities are defined as part of the project, either through a contract or other formal mechanism. Where different parties are involved in design, maintenance and operation of assets, the Project Management Framework requires clear handover of the assets at defined points.

Delivery against these requirements is monitored through the assurance regime described in Section 13.7 (for internal LU projects and between LU and suppliers). The process for internal compliance with the Management System and standards is set out in Section 2.4.4.

13.2 Asset Management System

LU's asset management system is based on the BSI PAS 55-1:2008 (Specification for the optimised management of physical assets) against which LU achieved certification in June 2011. To achieve certification, LU demonstrated that an effective management system is in place linking LU's overall organisational strategic objectives through an Asset Management (AM) Policy and Strategy to Asset Group Strategies (AGS). These set out the strategic requirements for each asset area through to Asset Management Plans (AMPs). This structure enables LU to demonstrate links between strategy and delivery. LU's approach to AM is based on a Whole Life Cost approach ensuring that expenditure is optimised throughout the life of an asset taking into consideration the balance between cost, performance, condition and risk.

LU's Asset Management System is supported through clear requirements embedded in the LU Management System including statutory requirements and asset standards. Arrangements for the setting and management of standards, including design standards, are described in Section 2.4. These are summarised in Section 5 (Table 5.1) under the stations and trains headings. The related management process standards are contained under the management and assurance heading and systems integration/human factors standards are contained under the systems heading. The Statutory Instruments Register (Section 3), which contains details of all applicable asset-related legislation, is part of the Asset Management System. The process to

identify new and changing statutory requirements and to amend and update standards to reflect these requirements is described in Section 3.

The contract management and assurance arrangements described below are the means by which LU ensures that requirements are met by suppliers. This includes requirements for the design and maintenance of the LU network.

13.2.1 Design and maintenance

LU's Category 1 standards mandate that systems are in place so that risks to safety associated with asset through all stages of the asset life cycle are effectively managed. These requirements typically state that:

- assets are maintained in accordance with standards
- assets shall be entered into and withdrawn from service in a controlled manner
- assets are designed by competent staff in accordance with safe systems of work
- assets are maintained by competent staff in accordance with safe systems of work.

These standards set the requirements for design and maintenance activities carried out by LU or by suppliers to LU. The standards, and more detailed requirements, are set in the Project Management Framework (Section 2.4.2). Where designs result in significant changes to infrastructure or rolling stock, the safety verification scheme (described in Section 7.7) is applied.

The incorporation of safety requirements into asset maintenance is further ensured through LU's Asset Management framework, including:

- improvement of asset condition generally so as to minimise the risk to safety and provision of assurance in relation to this
- establishment of asset management regimes by reference to industry good practice
- all parties involved in asset management, including LU and Tube Lines, work together in joint groups to improve knowledge of assets and the required performance
- all parties to take each other's asset management plans/programmes into account when drawing up work plans
- measurement progress against safety risks as part of asset management
- certification to the Asset Management Standard PAS55 by LU (achieved) and Tube Lines (to be achieved by December 2011)
- all parties to co-operate in developing condition and residual life measurement techniques in the interests of reducing the risks to safety and service loss.

As part of contractual arrangements, Tube Lines, PFI Suppliers and other suppliers are required to put appropriate safety management systems and controls in place. Where LU is not directly involved in the delivery or management of assets, LU's role in design is as setter of requirements, associated standards and seeker of assurance of compliance with such requirements and standards.

13.2.2 Asset Maintenance regime

LU's maintenance regime is set out in the Management System, including the asset management regime, engineering standards, HSEMS and the assurance regime. It aims to ensure that all safety risks are effectively managed in line with the Asset Management system. Details on maintenance of Management System documents (including standards and procedures) is set out in Section 2.

Asset Condition Reports are prepared each year for each asset type in accordance with LU Category 1 Standard: Asset Condition Reporting (ACR). Asset condition is assessed against set criteria, to prepare Asset Safety and Management Certificates. The Asset Condition Reports and Asset Safety & Management Certificates together:

- provide assurance to the Rail and Underground Board and other stakeholders that the assets are of known condition at the stated point in time and are fit for purpose
- allow asset condition trends to be monitored
- identify residual safety and performance risks and their associated mitigations and controls
- inform the asset investment planning process.

The Asset Safety and Management Certificates are signed by the appropriate Head of Profession for the asset type.

The Asset Condition Reports also feed into the Annual Asset Management Plan (AAMP) for each asset area. These are produced by the LU Strategy and Service Development Directorate. The AAMP inputs to the asset management strategy. It provides details of what work is planned for the next two years in order to deliver the Asset Management Strategy and when this work will take place.

To improve asset maintenance performance and management, the responsible heads of asset maintenance conduct regular reviews of performance indicators and failure history in order to prioritise remedial work based upon data maintained by APD and/or provided by the HSE Directorate.

Where it is identified that an asset needs major improvement or replacement, Asset Sponsors determine the most cost effective asset management solution based on:

- the nominal life expectancy of the asset
- the asset condition and performance
- the asset environment and usage
- the asset technology strategy.

Details of assets maintained by APD are stored on the Ellipse Asset Management System. A programme exists to fully populate all assets onto this system and for those assets not yet populated, existing systems will continue to be used to manage assets. Some existing, specialised, legacy systems will continue to be used for managing a small number of assets once Ellipse is fully populated. Each Head of Asset Division is responsible for providing assurance that details of their assets are kept up to date in line with PAS55 requirements.

Where asset concerns highlighted by the ACR have a safety implication, a risk assessment is conducted. This is used to identify actions needed to mitigate the risk or manage the asset safely.

Assets are designed and built to the standards applicable at the time of construction. LU ensures that these assets are fit for purpose through the asset management regime described above. Non-compliance to standards is managed through the process described in Section 2.

13.3 Contract management

The following sections explain the health and safety aspects of the contracts and agreements and:

- how contracts with Tube Lines, PFI partners and other suppliers are managed
- how contracts with other members of the LU and TfL Group are managed
- how agreements with other train operating companies, station operating companies and other infrastructure managers are managed
- the procurement processes that are applied to other suppliers.

Risk control obligations are discharged through the health and safety related contractual mechanisms included in contracts and agreements with these organisations and application of these contractual mechanisms. This includes LU Category 1 standards.

Contract management involves measuring suppliers' performance, taking any corrective action required, setting requirements, ensuring compliance with standards, negotiating variations and organising appropriate payment in accordance with contract terms. LU's Capital Programmes and Commercial Directorates ensure that suppliers deliver their obligations to time and scope (in line with their contracts). The directorates also ensure that LU's supporting obligations are effectively delivered to support suppliers' programmes.

Compliance with LU and other relevant standards, legal requirements and the contract is managed through a number of systems. This includes

- risk-based audit/surveillance of performance in accordance with the assurance regime
- regular LU-supplier contract meetings where health, safety and environmental issues are discussed
- delivery of the Verification Action Plan
- direction which allows LU to instruct that a specific action be undertaken or works stopped
- Engineering Regulatory Notices (ERNs) which must be complied with, including removing the asset from service if necessary

The processes above also apply internally within LU to ensure compliance with the relevant standards and legal requirements.

LU ensures effective co-operation with other LU Group members, Network Rail, other train operating companies, station operating companies, other suppliers and their

suppliers through effective contract management, including the pro-active handling of risks associated with interfaces with National Rail partners. This ensures that all parties can fulfil their obligations to provide services reliably and ensure that staff carry out their obligations in a safe manner.

13.4 The PPP contract

A number of mechanisms are set out in the PPP Contract that support LU's ability to monitor and manage the health and safety performance of the PPP Supplier. These include assurance, audit, provision of engineering information, standards and the development of and the progress against safety objectives. In the context of this document, the term PPP supplier refers to Tube Lines Limited.

The PPP contract was revised and re-issued in 2010. Performance against specifications set out in the contract are monitored and reviewed as set out below. However, given that the PPP Supplier, Tube Lines, is a wholly owned subsidiary of Transport for London, greater emphasis is now put on delivering performance specification targets and improving health and safety performance through collaborative working between LU and Tube Lines. LU manages risk through the assurance regime described in Section 13.7.

Although LUL Nominee Company SSL and LUL Nominee Company BCV exist as legal entities, all staff have been transferred to LU/TfL and all activities are delivered in line with LU's Management System.

13.4.1 Incentivising health and safety performance

The PPP Contract requires asset improvement and health and safety improvement to work together. The greater part of the overall incentive is through the operation of the performance regime and the requirement to comply with applicable standards during delivery of contractually defined works. In addition, the PPP Contract includes process provisions to require Tube Lines to implement safety changes when required by or agreed with LU. The three most significant parts of the PPP Contract that require health and safety improvements to be made are:

- performance and asset management requirements - these require Tube Lines to improve asset performance and therefore to improve the quality and effectiveness of the asset base. In doing so, it is required to demonstrate that these assets and associated maintenance practices have an ALARP safety risk
- Standards Code - the LU standards regime mandates compliance with Category 1 Standards that are designed to ensure that safety risks are reduced to an ALARP level
- Safety Regime - the Safety Agreement requires that Tube Lines works with LU to maintain safe operation of the Underground network and to ensure LU complies with its statutory obligations.

13.4.2 PPP contract overview

The PPP Contract was established to deliver improvements and restore asset health to LU's infrastructure, trains and stations. Under the PPP arrangements, LU has:

- overall responsibility for safety of the Underground network
- powers of direction on all matters of safety
- powers to set, change and enforce standards in all matters relating to Underground system safety
- powers to approve or reject in advance, any type of change proposed insofar as it might affect Underground system safety
- the means to work co-operatively on all matters of safety and the means to ensure that all parties participate in this
- powers to intervene, if necessary, should activities undertaken in respect of the LUL network appear to or are likely to jeopardise safety.

The PPP Contract follows a common framework that includes:

- a service contract mandating compliance with the Safety Agreement and including a change mechanism for delivering safety improvements and for compliance with changes to legislation and regulations,
- a set of contract schedules that contain the requirements for performance, asset management, legal terms, financial and payment methodologies and contract management,
- a series of codes providing a consistent approach to key issues such as standards, and risk management, performance measurement and access to undertake work on the LU network, and
- a series of other specific agreements that cover items such as safety, major enhancements, Transplant and the Emergency Response Unit.

In the context of safety, the most important element of the PPP Contract is the Safety Agreement. This agreement mandates that Tube Lines is required to do all that it is able to ensure that LU maintains its obligations as infrastructure manager and safety authority responsible for health and safety of any person affected by its undertaking. To achieve this, the Safety Agreement places a number of obligations on Tube Lines, including obligations to:

- perform its obligations under the contract in a manner that complies with all principles and guidance in relation to health and safety published from time to time by any regulatory authority which are applicable to the contract
- perform its contractual services in a manner that does not put LU in breach of its Safety Certification and Safety Authorisation, or any other party or railway operator in breach of their Safety Certification and/or Safety Authorisation
- notify LU of any inquiry by any statutory body or prosecution incurred as a result of performance or non-performance of contractual obligations
- attend a safety meeting every year for the purpose of developing a safety plan for LU
- comply with all reasonable instructions regarding the allocation and use of space at stations to enable LU to comply with its statutory fire safety compliance obligations.

The Safety Agreement also contains obligations relating to co-operation. This requires Tube Lines to co-operate with LU so as to enable compliance with the statutory obligation to provide safe customer services. This co-operation includes:

- the provision of documentation
- access to employees or assets
- participation in joint working, including participation in working groups on issues and safety risks and participation in the Risk Assessment Forum
- co-operation with National Rail network parties, PFI Suppliers and any other party that has entered into a contract with LU.

The Safety Agreement also includes specific reference to how the CDM Regulations apply to the PPP environment.

If Tube Lines fails to meet its obligations under the Safety Agreement, there are a number of contractual remedies that may be applied. These include a series of mechanisms that permit changes to the Service Contract and the obligations of the parties to ensure day to day operations and improvements to the LU network will continue to be delivered safely and effectively. In respect of safety, the key provisions are:

- the safety change procedure is contained in the Service Contract. This allows LU to request or require Tube Lines to make enhancements, modifications or improvements to the LU network or change their working practices. This change procedure can only be invoked to meet the terms of the Safety Agreement or to prevent LU failing to comply with legislation. The procedure envisages the agreement of the parties before changes are made, but LU can insist on implementation without prior agreement. In effect this gives LU the power of mandatory contractual variation to resolve safety concerns. If Tube Lines does not comply with this clause then LU are able to use additional remedies
- the change clause which allows the parties to agree matters of mutual interest lying outside the scope of other performance requirements or obligations. This provides a mechanism to agree and implement safety related improvements over and above those required by law or the Safety Agreement
- the Standards Code which parties must comply with in order to change standards or have concessions to standards granted.

Both LU and Tube Lines report to the Rail and Underground Board and both parties work together to ensure potential safety issues are addressed and resolved collaboratively.

Risk allocation is included within the PPP Contract as obligations for each party. Tube Lines is required to prepare and report on a risk register for all relevant risks.

13.4.3 Dealing with non-compliance

The PPP Contract affords LU a range of remedies to deal with non-performance by Tube Lines. The mechanisms that LU uses to manage Tube Lines non-performance, including safety performance, are:

- service points which could reduce the payment to the Tube Lines for failure of a specific contractual obligation, such as the delivery of key contractual plans or failure to remedy an asset defect reported to the Fault

Reporting Centre in a timely fashion. Service Points have a financial value attached to them which is defined in the Service Contracts

- Engineering Regulatory Notices (ERNs) which must be complied with, including removing the asset from service if necessary
- Corrective Action Notices (CANs) which are notices served by LU in respect of any non-compliance with the PPP Contract and requiring compliance within a stated time period
- risk-based audit/surveillance of performance in accordance with the assurance regime
- direction/emergency direction which allows LU to instruct that a specific action be undertaken
- step-in: where there has been a failure to deliver against the actions of a CAN and continues to do so LU can step in and undertake the necessary work ourselves or contract a third party to do it. LU is able to exercise emergency step in rights where there are health and safety or security issues that must be addressed
- safety breach whereby as the result of a prohibited act or safety breach, LU is entitled to serve a warning notice in respect of Tube Lines shareholder, employee or sub-contractor that prohibits their further involvement within the Tube Lines.

In the event of Tube Lines being in breach of its statutory obligations under health and safety law, LU may request intervention by the Office of Rail Regulation (ORR) or any other enforcing body. This course of action may be undertaken independently of the contractual mechanisms described above.

LU and Tube Lines report to the Rail and Underground Board and both parties work together to ensure potential safety issues are addressed and resolved collaboratively.

13.5 PFI contracts - overview

LU has a number of PFI contracts which are designed to deliver specific services or improvements. Each PFI contract is managed through a contract that includes regimes covering operation, maintenance, renewal, upgrade and contract management provisions that make sure that the contractor implements change requests efficiently and complies with the contract. These management provisions include ensuring that each PFI Supplier meets agreed targets and standards for:

- service performance
- quality
- safety
- security.

Each contractual regime consists of high level principles supported by summaries of how the principles will be put into practice. The regimes define their own control process by means of which the supplier implements any change to principles or the way in which they are operated.

All PFI contractors are required, through the contract, to have an approved safety management system in place. These systems include details relating to risk

assessment and control and the provision of assurance in addition to the safety review and change control process.

Each contract provides for compliance with the appropriate standards relating to the operation of the CDM Regulations and other interfaces, for example interfaces between Tube Lines, LU and the PFI Supplier. In operating the PFI contracts, arrangements are in place for day to day monitoring of contractor safety performance via audits and inspections. LU's assurance process caters for changes to PFI contracts using strict risk assessment and management techniques.

13.5.1 PFI contract management

LU's PFI contract management arrangements ensure that LU's contractual obligations are effectively discharged in the relevant area of LU and that the overall operation and co-ordination of these is undertaken. Contractual obligations in respect of implementation and performance are discharged via the relevant PFI contract Manager as follows:

- undertaking any necessary corrective actions identified through performance monitoring, particularly with regard to safety performance
- undertaking any actions needed to ensure the safety risks allocated by the relevant PFI contract between the parties are managed correctly and remain in line with that allocation
- ensuring LU directorates with delegated contractual obligations have clear access points into the contract management process so that concerns are identified, resolved and feedback provided
- ensuring liaison with other LU directorates to resolve and communicate any contractual problems, issues or resolutions that have been identified
- ensuring LU and Tube Lines meet contractual obligations in terms of co-operation, partnership, disclosure and reasonable behaviour
- identifying, understanding, allocating, recording and managing all the interfaces existing between LU and all suppliers.

LU is responsible for the management and control of the PFI contracts, as they are mainly concerned with developments across the LU network. However, performance management of certain LU obligations under PFI contracts may be delegated to Tube Lines in the PPP Supplier Service Contract. Performance is assessed against the following criteria:

- the service performance and quality delivered
- operational performance against standards and Key Performance Indicators (KPIs)
- the achievement of required standards for safety, quality and environment and security
- the achievement of standards set by external regulations and LU engineering standards.

These performance data are reviewed against required targets and standards.

13.5.2 Managing the performance of PFI contracts

Variations and disputes are managed by the PFI teams using procedures detailed in the contracts. Enforcement processes include the use of deficiency points, CANs, ERNs and liquidated damages. Persistent infringement may ultimately lead to contract termination.

Audit is used to ensure processes are being adhered to by PFI Suppliers and safety and technical audits are programmed and co-ordinated by the Head of HSE Systems, Standards and Audit.

Regular contract meetings are held where safety, quality and environmental performance matters are reviewed. The LU PFI teams are actively supported by an LU Health, Safety and Environment Adviser.

Interfaces on multi-occupancy sites are identified and managed in conjunction with Tube Lines. Compliance with the PPP Contract Access Code ensures potential site conflicts are avoided.

13.6 Procurement

LU recognises the potential for suppliers or contractors brought onto the LU network, or who affect operations, to have an impact on the significant risks. LU controls this impact by selecting suppliers and managing them to make sure the risks introduced are minimised and where there are, this is done in a controlled manner and in line with ALARP principles. LU achieves this through:

- maintaining sufficient competent specialist procurement resource within LU
- clearly defining client requirements
- assessing and selecting suppliers against criteria including assessment against their ability to work safely and meet LU's safety requirements
- assuring suppliers LU trades with, confirming the suitability of the supplier's health and safety management system,
- achieving best value for money
- maintaining records about supplier performance.

Requirements for the control of health and safety aspects of contractor management are established through the LU Category 1 HSEMS Standard: Procuring and Managing Suppliers and Contractors – HS&E Requirements. This includes:

- supplier selection and tender evaluation
- the management of suppliers/contractors
- the application of the Construction (Design and Management) Regulations
- management of work interfaces.

Accountable managers responsible for managing contractor/suppliers working on LU sites provide data on supplier performance including health and safety data. This data is used in the management of contractors/suppliers. It is also considered during the procurement process. All LU suppliers must comply with LU Category 1 standards.

13.7 Assurance

This section explains how LU obtains assurance that safety and technical requirements in respect of design, maintenance and other aspects are being complied with. This includes internal and supplier compliance. It describes how these assurance arrangements are sufficient to enable LU to meet its responsibilities as infrastructure manager for the LU network and as a train operator over Network Rail infrastructure.

LU's arrangements are risk based, controlled, operated by competent people and verify that the requirements specified through legislation or internal and external standards are satisfied. The verification process involves regular review at all stages of asset management, including procurement, design, delivery, operation and disposal. These requirements provide the framework for effective asset management, which lead to the effective control of system risk.

All of those involved in the assurance processes, as receivers or providers of assurance, also employ controlled processes in order to provide independent assurance of the effectiveness and adequacy of the assured delivery or management processes. The assurance processes also provide the means by which non-compliance with requirements is identified, controlled and corrected (where required).

LU's assurance processes enable us to demonstrate that safety is secured on an on-going basis and that corrective action is taken when assurance activity identifies that it is required. This enables us to:

- be confident that members of the LU Group, other railway operators and other suppliers that may have an impact on the LU network are adequately carrying out their responsibilities for managing system risk
- make sure LU requirements are complied with
- demonstrate compliance to regulators and stakeholders.

13.7.1 LU assurance standard

LU's assurance arrangements for design and maintenance are controlled through a Category 1 Standard: Assurance. The scope of this standard includes all matters relating to safety and technical systems and related management system, operational, human interface and legislative requirements. The standard establishes requirements for:

- the management of requirements - including legislation, internal and external standards
- the accreditation, as appropriate, of departments, or individuals to perform delivery and assurance activities
- verification activity - including audit, inspection, monitoring, review, observation and licensing
- the management of assurance evidence
- determining the level of assurance evidence and verification required.

The standard requires receivers of assurance to determine assurance requirements in terms of levels of assurance evidence required and the scope/depth of verification activities in respect of those providing assurance.

Objective criteria have been defined for determining assurance requirements and these are applied within a risk based framework taking into consideration for new and existing systems, assets and activities such elements related to the people involved, the assurance processes operated and the risk associated with the product, including:

- the criticality of risk
- the level of understanding of asset condition
- the complexity and manageability of mitigation regimes and interfaces
- engineering and operational risks of works and completed projects
- the complexity of interfaces for new works
- the recorded previous performance of the assurance provider in respect of:
    - the particular work activity,
    - the requirements placed upon the provider of assurance, and
    - the outputs from the assurance process.

The LU Category 1 Standard: Assurance is supported, within the standard, by a set of assurance principles. These have been developed to promote a common understanding of the assurance regime and the processes within it.

13.7.2 Assurance chain

The assurance regime has adopted the concept of an assurance chain. This has been adopted in order to describe and define the relative positions, roles and responsibilities of each entity in the chain. The principle embedded in these arrangements is that all organisations that carry out operations on or about the LU network have responsibilities to provide assurance to the level above in the assurance chain and receive assurance from the level below.

The accountabilities and responsibilities for all safety and technical assurance activities carried out by LU, Tube Lines, PFI Suppliers and other suppliers have been identified, recorded and reflected in standards, procedures or working arrangements. These include accountabilities and responsibilities for each stage of the asset design, maintenance and project delivery cycles and asset life cycles. The primary role for providing safety and technical assurance lies with Head of Profession, Tube Lines, PFI Suppliers and other suppliers. These suppliers provide details of their proposed assurance activities and evidence to LU for approval in the form of an assurance plan.

13.7.3 Key roles and responsibilities for assurance within LU

By applying the assurance processes, LU fulfils its assurance role by satisfying itself that Tube Lines, PFI Suppliers and other suppliers are complying with their obligations and demonstrating adequate levels of self-assurance. LU's assurance responsibilities lie predominantly in the Capital Programmes, Asset Performance and Health, Safety and Environment (HSE) Directorates. The Assurance process also applies to activities/roles fulfilled by LU.

The following sections describe how the assurance regime is applied and the extent of verification activity is determined. Such verification activity may be undertaken through review meetings with the supplier, through document review or by physical inspection.

The level of all such activities is risk-based and may be varied depending on confidence levels. The HSE Directorate has inspection/assurance resources that operate directly at the physical supplier/LU interface in order to seek assurance of compliance and performance. LU also undertakes audits of suppliers as described in Section 11.

13.7.4 Application of the assurance regime

The LU Category 1 Standard: Assurance, supported by the assurance principles, requires LU's assurance regime to be based on the appropriate level of intrusion necessary to fulfil the assurance needs of the next higher level in the assurance chain. This means a structured and systematic approach to assessing assurance and its effectiveness is adopted to establish the extent that LU is assured by suppliers' design, maintenance and delivery activities and their self-assurance arrangements. Suppliers apply similar principles within their own organisations and to their suppliers.

Whilst the assurance regime operates on the premise that there should be trust between the receivers and providers of assurance, the assurance regime is designed to establish the appropriate level of intrusion, intervention and assurance requirements based on Tube Lines, PFI Suppliers' and other suppliers' ability to demonstrate the effectiveness of their delivery, assurance and self-assurance arrangements.

On-going arrangements for assurance allow LU to increase levels of intrusion, including audit and other assurance activities where suppliers do not provide effective assurance or fail to demonstrate adequate self-assurance or delivery arrangements. The levels of risk associated with the areas where confidence levels are low are taken into consideration when determining the levels of intrusion/intervention required. The assurance regime is applied both directly (via increased verification, intrusion or intervention) and indirectly (via overview of supplier/operator self-assurance) to:

- asset design
- asset renewal/refurbishment/build
- asset maintenance
- the correct use of assets
- staff, supplier and customer awareness
- guiding policies, systems and processes.

These represent the means by which, in combination, each significant risk is controlled. These aspects are taken into consideration as part of the on-going assessment of confidence levels described below.

LU also reviews the levels of intrusion required in relation to suppliers' activities:

- at times of significant organisational or other change, or
- following significant safety related incidents, or
- as the result of consistent safety related process or technical failure, or
- where self assurance activities are found to be inadequate, or
- if actions to address safety related matters are not effective or timely.

By systematic examination, assessment and audit of the effectiveness of Tube Lines, PFI Suppliers and other suppliers' assurance and self-assurance arrangements, LU determines the extent that the regime applied needs to be stepped up or down.

All suppliers are obliged to deliver assets which are safe and fit for use, accompanied by assurances that those assets are safe and fit and that any potential impacts of work being undertaken on them are properly controlled. This applies equally to new or enhanced assets and assets subject to routine maintenance or repair. The assurance standard has specific assurance criteria relating to the introduction of new or modified rolling stock into service (including testing) and the introduction of new or modified signalling and signalling control systems.

The assurance regime is designed so that LU can to accept assets into use, having undertaken the minimum level of intrusion consistent with being a diligent infrastructure manager. This approach yields a continuous audit trail to substantiate the safety of assets in every discipline and is a vital component of the safety justification of working arrangements.

Requirements set out in the contracts, project specifications and the relevant LU Standards. The results of assurance assessments and verification activities are fed back to the supplier and any improvement actions required are monitored.

Ultimately, the on-going level of intrusion and changes to the levels of assurance activities required are determined predominantly on

- the basis of the competence and professional judgement of the Head of Train Systems Engineering, Head of Systems Integration, the Head of Stations and Infrastructure Engineering, in the Capital Programmes directorate
- the application of the assurance regime above within a risk based framework
- the monitoring of the results obtained.

The Head of Engineering agrees, through the System Engineer, roles, verification and surveillance plans on a risk basis with the respective Heads of Professions for their respective asset or system areas. The Heads of Profession provide assurance to the Head of Engineering that these plans have been completed and that any non-compliance or safety issues have been addressed or an appropriate action is in place to address the issue. Where necessary, the Head of Engineering escalates non-compliance or safety issues to the LU Director of Health, Safety and Environment.

Where assessments indicate that intervention or intrusion measures are required, one, or a combination of the following, is initiated depending on criticality:

- detailed document checks
- physical asset checks before acceptance into use
- increased direct and indirect verification and focused monitoring/management of highly critical aspects
- the issue of an Engineering Regulatory Notice (ERN)
- withdrawal of an asset from service
- non-release of works for use.

13.7.5 Preserving independence

The LU standards for assurance and audit describe requirements for independence in respect of assurance and audit activities. Both standards require employees engaged in assurance and audit processes to be sufficiently outside of the management chain responsible for an activity for objectivity to be achieved and demonstrated.

LU's assurance processes ensure independence is maintained for all assurance activities through a combination of:

- organisation and process design - including the segregation of assurance and delivery roles
- job design and job description
- clear standards, processes and procedures supporting the above
- receivers of assurance reporting lines being outside of assurance provider
- access to senior management and directors being outside of the direct reporting line
- powers of sanction - notably the Engineering Regulatory Notices
- competence and integrity of staff performing assurance activities.

As part of the on-going safety and technical assurance arrangements, LU reviews the effectiveness of suppliers' arrangements are for ensuring that independence is achieved in the implementation of their safety and technical assurance regime.

13.7.6 Resources for assurance

The design of LU's assurance regime ensures that sufficient resources are available to fulfil all specified and planned assurance requirements.

The design has also enabled assurance process consistency, activity co-ordination and adoption of best assurance practice. The Heads of Engineering and the Professional Heads of individual asset disciplines also operate a controlled process to ensure suppliers have adequate numbers of competent engineers. The requirements for this are within the LU Category 1 Standard: Assurance and in the Capital Programmes Directorate's procedures for accreditation.

13.7.7 Assurance through the complete asset life cycle

LU has defined the roles and responsibilities for safety and technical assurance throughout the asset life cycle. These include what assurance activities are carried out and who performs the activity. Running through each phase of the life cycle are continuous assurance activities such as audit, inspection, review, observation, accreditation, licensing, validation and provision of assurance evidence. The position in the assurance chain of regulators, LU, LU's suppliers and their suppliers have all been identified. These positions are reflected in the assurance process operated and the supporting standards and procedures.

LU's assurance role is to ensure that suppliers' assurance and self-assurance activities are adequate. The key roles that are specific to the stages of the asset life cycle are the:

- Heads of Engineering and Professional Heads of individual asset disciplines who, using a risk based sampling approach, carry out the following activities:
    - review User Requirement Specifications
    - review change implications
    - review approvals in principle, consent to test applications and compliance/completion applications in respect of new or modified plant works or equipment
    - review and derive levels of confidence in respect of completed certificates, assurance evidence, witness testing, equipment inspection, maintenance manuals, warranties and provision of spares
    - review and derive levels of confidence in respect of submitted evidence of maintainability and operability
    - review and derive levels of confidence in respect of submitted annual asset certification and asset condition assessments;
- LU Director of Health, Safety and Environment who advises significant changes to ORR (TfL Team) where required
- Access Management Manager who co-ordinates with Tube Lines, PFI suppliers and other suppliers for access booking and control
- Train Operators and Station Supervisors who receive assets for operation on a daily basis.

LU also undertakes safety and technical audits in respect of suppliers' design and maintenance arrangements. The arrangements for audit are described in Section 11.

13.8 Revision history of this section

Revision Number	Date	Changes
V2 (as Version 2.00)	October 2011	Five year renewal of LU's Safety Certificate and Safety Authorisation

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Section 14: Rolling stock

Contents

14.1 Summary of LU rolling stock

LU's passenger trains are either tube stock or surface stock. Tube stock is designed to operate on lines with the restricted structure gauge of tube tunnels. Surface stock is built to a gauge that is similar to main line stock. As LU is not part of the interoperable railway, legislative requirements which apply include those arising from the Health and Safety at Work etc. Act 1974, Regulations enabled under this Act and other regulations such as the Rail Vehicle Accessibility (Non-Interoperable Rail System) Regulations 2010 and the Railways and Other Guided Transport Systems (Safety) Regulations 2006. The way that LU responds to new or amended legislation is described in Section 3.

The regulations which apply in respect of the design and maintenance of LU's rolling stock include:

- Locomotives and Wagons (used in line and sidings) Regulations 1906
- Railways Act 1993
- Railways Consolidated Clauses Act 1845
- Railways and Transport Safety Act 2003
- Railway Safety (Miscellaneous Provisions) Regulations 1997
- Railway Safety (Miscellaneous Amendments) Regulations 2001
- Rail Vehicle Accessibility (Non-Interoperable Rail Systems) Regulations 2010
- Rail Vehicle Accessibility (Networks) Exemption Order 2010
- Rail Vehicle Accessibility (London Underground Victoria Line 09TS Vehicles) Exemption Order 2008
- Rail Vehicle Accessibility (London Underground Metropolitan Line S8 Vehicles) Exemption Order 2010.
- Rail Vehicle Accessibility (London Underground Metropolitan Line S8 Vehicles) Exemption Order 2011.
- Railways and Other Guided Transport Systems (Safety) Regulations 2006
- Railways and Other Guided Transport Systems (Safety) (Amendment) Regulations 2006
- Railways and Other Guided Transport Systems (Safety) (Amendment) Regulations 2011
- Railway Safety Regulations 1999

The requirements of these regulations are integrated into LU's Management System through standards.

All trains are one person operated (OPO) and, apart from on the Central, Jubilee and Victoria lines, are driven manually and protected from the consequences of passing signals at danger using trainstops and tripcocks [Note: tripcocks are not used on stock operating on the Victoria, Jubilee or Central lines].

On the Central, Jubilee and Victoria lines, trains are driven by an automatic driving system. Safety on these lines is assured using Automatic Train Protection (ATP) circuitry that receives data from the signalling system and sets the maximum safe speed

at which the train may proceed and the limit of its movement authority. In the absence of such data, the trains will stop.

If the maximum safe speed is exceeded when operating in Automatic Train Operation (ATO) mode on the Central, Jubilee or Victoria lines, the train will be automatically braked using the service brake until the speed is below the maximum safe speed. If the ATO is defective or the train is being driven by the Train Operator in protected manual and the target speed set by the signalling system is exceeded, a brake application will be made until the train is brought under the target speed. If the train exceeds its limit of movement authority, in either ATO or protected manual modes, the train will be automatically braked to a standstill.

In the event of a manually operated train passing a signal at danger, Speed Control After Tripping (SCAT) equipment ensures that the Train Operator cannot exceed 16 km/h for a time after the tripcock is reset. On the Victoria, Jubilee and Central line, if the trackside or train borne signalling system fails and it is necessary to move the train, a Restricted Manual mode may be used. The train's control system prevents the train exceeding 16 km/h at all times whilst restricted manual is in use by making an emergency brake application if 16km/h is exceeded for any reason. The brake is released by the ATP once the speed is below the 16 km/h limit.

All trains are fitted with service and emergency braking systems that provide redundancy and hence have a very low risk of complete brake failure. All trains, including the automatic trains when being driven manually, are provided with Dead Man's Handles. These apply the emergency brakes if released by the Train Operator. Emergency brake rates are compatible with signal overlaps.

All trains have been designed and are maintained to:

- operate within a declared swept envelope that is within the structure gauge
- control the risk of parts falling from trains to minimise the risk of derailment
- minimise the risk of collision through train protection/signalling/braking systems
- minimise the consequences of collisions through structural design.

A summary of the fleet is given in Tables 14.1 – 14.3 below [Note: The dates referred to are the first date of build. The process of building and commissioning the required trains took several years.].

Stock	Lines	Composition	Fleet size	Nominal Build date	Built by
C69/C77	Circle Hammersmith & City District	3 x 2 car	46	1970/ 1977	Metro Cammell
D78	District	2 x 3 car	75	1978	Metro Cammell
A60/A62	Metropolitan	1 x 4 car 2 x 4 car	56.5 (8 car units)	1961	Cravens

S8 Stock	Metropolitan (being progressively introduced from 2010. 'A Stock' will be subsequently withdrawn)	1 x 8 car	58	2010	Bombardier Transportation Ltd

Table 14.1 Surface stock which is maintained by LU's Asset Performance Directorate

Stock	Lines	Composition	Fleet size	Nominal Build date	Built by
1972 Mark 1&2	Bakerloo	1 x 3 car + 1 x 4 car	36	1972	Metro Cammell
1992	Central	4 x 2 car	85	1993	Adtranz
1992	Waterloo & City	2 x 2 car	5	1993	Adtranz
2009	Victoria	2 X 4 car	47	2009	Bombardier Transportation Ltd

Table 14.2 Tube stock which is maintained by LU Asset Performance Directorate

Stock	Lines	Composition	Fleet size	Nominal Build date	Built by
1996	Jubilee	1 x 4 car plus 1 x 3 car	63	1997/2005	Alstom
1995	Northern	2 x 3 car	106	1998	Alstom
1973	Piccadilly	2 x 3 car	87	1974	Metro Cammell

Table 14.3 Tube stock which is the responsibility of Tube Lines.

The 1995 Tube Stock is maintained by Alstom; the remainder is maintained by Tube Lines

All trains carry a range of emergency equipment to deal with incidents. These may include:

- fire extinguishers
- detrainment ladders
- carry sheets
- shoe paddles,
- shoe straps
- detonators

- short circuiting devices (to prevent the recharge of traction current on LU Infrastructure).

Stock which travels on Network Rail tracks also carry Network Rail track circuit operating clips to maintain the signal in the rear at danger in the event of Network Rail lines being obstructed.

Where other rolling stock, e.g. historic rolling stock, is operated on LU's infrastructure, appropriate assurance arrangements (as set out in Section 7) to ensure that this stock is operated safely.

14.2 Approval for trains to operate on the LU network

The arrangements for trains to run over the LU network are governed by:

- certificates of technical conformance which confirm that the rolling stock complies with standards, is compatible with the route and there are appropriate maintenance regimes in place
- the company's Safety Certification and Safety Authorisation
- safety assurance of operational arrangements.

Approval for LU rolling stock to operate on Network Rail infrastructure is achieved in accordance with Railway Group Standards. Where LU rolling stock operates in proximity to other transport undertakings infrastructure, comments are sought from the relevant parties and considered as part of the LU approvals process, as described in LU's Category 1 standard: Assurance.

Other train operating companies are also governed by track agreements that dictate how often a train operating company is allowed to operate.

All rolling stock that is new or reintroduced to the LU network, or modifications to existing stock, is formally approved before it can be operated in accordance with the LU Category 1 Standard: Assurance. This standard requires the production and approval of appropriate engineering certificates and production and approval of operating procedures. Introduction of the new S-Stock on the Metropolitan line (introduced into passenger service in 2010) and '09 Stock on the Victoria line (fully rolled out in 2011) followed the assurance procedures and relevant asset standards. This included a robust testing for both stocks prior to introduction into passenger service.

Certificates of Technical Conformance certify that vehicles, when operated in planned mode will comply with all appropriate legislation and engineering standards. The relevant legislation is identified through the mechanism described in Section 3.1. The LU Professional Head of Rolling Stock, or his authorised deputy, issues these certificates and may at any time withdraw, suspend or modify them. The scope of the certificates includes compliance, where relevant, with standards for:

- train protection
- crash worthiness and structural strength
- performance of power and parking brakes
- performance of traction system
- type of materials employed

- fire performance
- provision of fixed and portable safety equipment.

These certificates also certify that the rolling stock is compatible with the route and include:

- kinematic envelope within the structure gauge
- weight distribution compatible with the infrastructure
- ability to operate track circuits correctly
- interaction of the vehicle with the track and power supply
- compatibility with other vehicles using the route
- compatibility of doors and step-plates with platforms.

The certificates also certify there is an appropriate maintenance policy in place.

Plant Approval Certificates, issued on behalf of the LU Professional Head - Permanent Way, are required for track maintenance plant or equipment.

These certificates cover the following:

- identification number
- type of operation
- area of operation
- operational limitations or conditions
- type of approval granted
- period of certification.

All, but the first bullet point, are only relevant in relation to rail mounted plant.

The Plant Approval Certificates certify that the equipment complies with statutory regulations, company requirements and track engineering standards. Where the plant is defined as a rail vehicle, a Certificate of Technical Conformance is also required.

Where the operational arrangements proposed for rail vehicles differ from the LU Rule Book, LU requires that, prior to the commencement of operations, a concession against the relevant standard is in place, in accordance with the arrangements described in Section 2.4.7. This applies:

- when a new piece of rolling stock or on-track plant is introduced to the Underground, such as TransPlant equipment, or
- when a maintenance contractor wants to use on-track plant for a specific job, the vehicle will usually be removed from the Infrastructure once the job/project has been completed, or
- when test train movements are required where the stock being used is not regular passenger stock formations, or can not be operated in the usual way

The Network Services Director, or his authorised deputy, reviews the proposed arrangements to ensure that they comply with legislation and do not compromise the safety of LU's operations. Operation of the rail vehicles is permitted once the following assurances have been provided:

- that the risk associated with the operation of the rail vehicle is as low as reasonably practicable
- all responsibilities have been identified, assigned and training has been provided.

The frequency and timings of any train operation are agreed between LU Timetables and the train operator. Trains will only come on to the LU network under the control of the Service Controller.

14.3 Maintenance of rolling stock

All rolling stock operated by LU is maintained by LU's Asset Performance Directorate, Tube Lines or the train manufacturer under contract. Maintenance requirements are mandated via the maintenance provisions within LU Category 1 Standard: Rolling Stock. The standard mandates for each type of rolling stock:

- acceptance of the maintenance regime by LU, including changes to the regime
- yearly review of the maintenance regime
- documentation requirements
- train maintenance plans covering all systems and sub-systems to be produced
- record keeping
- Minimum Asset Condition Standards (MACS)
- dealing with faults in service
- post-maintenance testing
- monitoring and review of train performance.

Compliance with requirements is assured through the assurance arrangements described in Section 13.7 and the audit arrangements described in Section 11. An overview of maintenance plans is maintained by the relevant manager.

14.4 Rolling stock modifications

Rolling stock modifications are managed by LU's Asset Performance Directorate or Tube Lines. Details of all rolling stock modifications and supporting information are maintained on databases that record details of the changes/modifications, drawing numbers, programme information and any special instructions. In respect of minor changes these are reviewed and signed off by the LU Professional Head and/or Tube Lines Rolling Stock Asset Engineer, or delegated authority. In respect of more significant changes requiring Certificates of Technical Conformance to be issued these are required to be reviewed and signed off by the LU Professional Head of Rolling Stock, or his authorised deputy.

Details of changes/modifications that have been sufficiently significant to require approval by LU and ORR are also maintained by LU's Asset Performance Directorate, Tube Lines or the Train Supplier, as appropriate to the arrangements in place.

Section 13 described LU's assurance process through which LU is assured that the safety and technical requirements of bringing modified, upgraded or renewed rolling stock into service are met.

14.5 Revision history of this section

Revision Number	Date	Changes
V2 (as Version 2.00)	October 2011	Five year renewal of LU's Safety Certificate and Safety Authorisation

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