

LRSSB - LRG - 20.0



Fire and Rescue Guidance


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DESCRIPTION:				
This document provides guidance on the application of the Regulatory Reform (Fire Safety) Order 2005 in England and Wales, the Fire (Scotland) Act 2005 in Scotland				
EXPLANATORY NOTE:				
LRSSB is not a regulatory body and compliance with this guidance document is not mandatory. This document reflects good practice and is advisory only. Users are recommended to evaluate this guidance against their own arrangements in a structured and systematic way, noting that parts of this guidance may not be appropriate to their operations. It is recommended that this process of evaluation and any subsequent decision to adopt (or not adopt) elements of this guidance should be documented. Compliance with any or all of the contents herein, is entirely at an organisation's own discretion.				
SOURCE / RELATED DOCUMENTS:				
LRG 1.0 Tramways and Principles Guidance (TPG) (LRSSB) LRG 8.0 Guidance in the Management of Vulnerable Persons (LRSSB) Fire Safety Risk Assessment – Transport Premises and Facilities DCLG Publications Operational Guidance – Railway Incidents Chief Fire and Rescue Adviser				
RELATED TRAINING COURSES:			RELATED LEGISLATION:	
			Health and Safety at Work Act etc. 1974 Management of Health and Safety at Work Regulations 1999 The Railways and Other Guided Transport Systems (Safety) Regulations 2006 (As amended) Regulatory Reform (Fire Safety) Order 2005 (as amended) Fire (Scotland) Act 2005 Fire Safety (Scotland) Regulations 2006 The Fire and Rescue Services Act 2004 Dangerous Substances and Explosive Atmospheres Regulations 2002	
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TERMS AND ABBREVIATIONS

Table A – Terms

Term	Definition (From the FSO / FSA Unless Otherwise Stated)
Dangerous Substance	<p>(a) A substance or preparation which meets the criteria in the approved classification and labelling guide for classification as a substance or preparation which is explosive, oxidising, extremely flammable, highly flammable or flammable;</p> <p>(b) A substance or preparation which because of its physico-chemical or chemical properties and the way it is used or is present in or on premises creates a risk; and (c) Any dust, whether in the form of solid particles or fibrous materials or otherwise, which can form an explosive mixture with air or an explosive atmosphere.</p>
Duty Holder	For this document, this is interchangeable with 'Responsible Person'.
Competent Person	<p>Competence is the ability to work to an agreed standard on a regular basis. It involves practical and thinking skills, experience and knowledge, and may include a willingness to follow agreed standards, rules and procedures. The combination required depends on what needs to be done, in what circumstances and how well.</p> <p>(Definition from ORR.)</p>
Employee	A person who is or is treated as an employee for the purposes of the Health and Safety at Work etc. Act 1974(4) and related expressions are to be construed accordingly (for example, 'staff').
Explosive Atmosphere	A mixture, under atmospheric conditions, of air and one or more dangerous substances in the form of gases, vapours, mists or dusts in which, after ignition has occurred, combustion spreads to the entire unburned mixture.
Hazard	In relation to a dangerous substance: the physico-chemical or chemical property of that substance which has the potential to give rise to fire affecting the safety of a person.
Place of Safety	In relation to premises: a safe area beyond the premises.
Premises	<p>Includes any place and, in particular includes:</p> <p>(a) any workplace;</p> <p>(b) any installation on land; and</p> <p>(c) any tent or movable structure.</p> <p>(Excluding vehicles used as a means of transport.)</p>
Relevant Person	<p>In relation to premises:</p> <p>(a) any person who is, or may be, lawfully in the premises; or</p> <p>(b) any person:</p>

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	<p>I. who is, or may be in the immediate vicinity of the premises; and</p> <p>II. whose safety would be at risk in the event of fire in the premises.</p> <p>(Both the FSO and the FSA exclude firefighters carrying out fire operations from this definition.)</p>
Term	Definition (From the FSO / FSA Unless Otherwise Stated)
Responsible Person	<p>The FSO (England and Wales) (Clause 3):</p> <p>(a) in relation to a workplace, the employer, if the workplace is to any extent under his control;</p> <p>(b) in relation to any premises not falling within paragraph (a):</p> <p style="padding-left: 20px;">I. the person who has control of the premises (as occupier or otherwise) in connection with the carrying on by him of a trade, business or other undertaking (for profit or not); or</p> <p style="padding-left: 20px;">II. the owner, where the person in control of the premises does not have control in connection with the carrying on by that person of a trade, business or other undertaking.</p> <p>The FSA (Scotland) (Clause 53 and 54):</p> <p>(1) Each employer shall ensure, so far as is reasonably practicable, the safety of the employer's employees in respect of harm caused by fire in the workplace.</p> <p>(1) Where a person has control to any extent of relevant premises the person shall, to that extent, comply with subsection (2).</p> <p>(2) The person shall:</p> <p style="padding-left: 20px;">(a) carry out an assessment of the relevant premises for the purpose of identifying any risks to the safety of relevant persons in respect of harm caused by fire in the relevant premises; and</p> <p style="padding-left: 20px;">(b) take in relation to the relevant premises such of the fire safety measures as in all the circumstances it is reasonable for a person in his position to take to ensure the safety of relevant persons in respect of harm caused by fire in the relevant premises.</p> <p>For this document, this is interchangeable with 'Duty Holder'.</p>
Risk	The risk to the safety of persons from fire.
Safety	The safety of persons in respect of harm caused by fire.
Workplace	<p>Any premises or parts of premises, not being domestic premises, used for the purposes of an employer's undertaking and which are made available to an employee of the employer as a place of work and includes:</p> <p>(a) any place within the premises to which such employee has access while at work; and</p> <p>(b) any room, lobby, corridor, staircase, road, or other place:</p>

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|--|---|
| | <ul style="list-style-type: none"> I. used as a means of access to or egress from that place of work; or II. where facilities are provided for use in connection with that place of work, other than a public road. |
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Table B – Abbreviations

Abbreviation	Definition
BS	British Standard
CLEAR	Collision, Lead, Evaluate, Act, Re-open
ECO	Electrical Control Operator
FRS	Fire and Rescue Services
FSA	Fire (Scotland) Act 2005
FSO	Regulatory Reform (Fire Safety) Order 2005
JESIP	Joint Emergency Services Interoperability Principles
LED	Light Emitting Diode
LRSSB	Light Rail Safety and Standards Board
m	Metres
mm	Millimetres
NOG	National Operational Guidance
OLE	Overhead Line Equipment
RAIB	Rail Accident Investigation Branch
RIO	Railway Incident Officer
RVP	Rendezvous Point
SHA	Strategic Holding Areas
SMS	Safety Management System
SSRI	Site-Specific Risk Information
TPG	Tramways and Principles Guidance
v	Volts

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1. Introduction

- 1.1. This guidance supports the high level principles set out in LRG 1.0 Tramway Principles and Guidance (TPG) published by the Light Rail Safety and Standards Board (LRSSB).
- 1.2. This document provides guidance for those delegated the responsibility of the application of the relevant fire safety legislation to a Light Rail system. It relates to UK Light Rail systems (Tramways) based on 'line-of-sight' operations only. As with all guidance, this document is not prescriptive and is intended to give advice not to set a mandatory industry standard, and it is based upon goal setting principles as best practice.
- 1.3. Much of this guidance is based on the experience gained from existing UK Light Rail systems and from published documents. It does not prescribe particular arrangements adopted by any existing UK Light Rail system and is intended to give guidance and advice.
- 1.4. This guidance is not intended to be applied retrospectively to existing Light Rail systems. However, owners and operators should consider and assess any implementation of this guidance and / or any subsequent revision, to ensure continual improvement.

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2. Scope

- 2.1. Sections 3-12 of this guidance document set out the requirements and principles to be implemented by Light Rail systems to enable compliance with the Regulatory Reform (Fire Safety) Order 2005¹ (FSO) (England and Wales) and the equivalent sections of the Fire (Scotland) Act 2005² (FSA) and the Fire Safety (Scotland) Regulations 2006³. These sections are specifically intended to support senior managers and managers who have responsibilities at strategic and premises levels in Light Rail organisations.
- 2.2. Section 13 of this document provides information to assist the interface between Light Rail systems and the Fire and Rescue Services (FRS), as they discharge their duties relating to emergency incidents.
- 2.3. This guidance applies to all Light Rail systems, to help protect Light Rail staff or others from the risk of fire whilst on or about a Light Rail system. This guidance will support the delivery of system's obligations as part of their safety management system (SMS). It provides information for managers who have responsibility for the safety of their staff, passengers and others who may use Light Rail premises.
- 2.4. This guidance does not apply to the design and / or construction of buildings or vehicles. Design guides and detailed technical information is available and signposted in this document. This guidance is tailored specifically to assist in the assessment of fire risk in existing buildings, to help those responsible to identify and manage fire safety measures.
- 2.5. Trams and other vehicles are specifically excluded from the fire safety legislation; premises used by Light Rail systems are included. This guidance provides information specific to the general types of premises, such as depots, offices, workshops and tramstops, used by Light Rail systems and general information about fire safety in trams.

The Regulatory Reform (Fire Safety) Order 2005 (The FSO) and the Fire (Scotland) Act 2005 (the FSA)

- 2.6. The Regulatory Reform (Fire Safety) Order 2005 (FSO) and Part 3 of the Fire (Scotland) Act 2005 (FSA), along with the Fire Safety (Scotland) Regulations 2006, set out fire safety duties in respect of the majority of non-domestic premises. All cover general fire precautions and other fire safety duties which are needed to protect 'relevant persons' in case of fire in and around most premises.
- 2.7. Both the FSO and the FSA require fire precautions to be put in place where necessary and to the extent that it is reasonable and practicable in the circumstances of the case. Responsible Person, Duty Holder and Relevant Premises are specific terms defined by the legislation, setting out who may be responsible for compliance.

1 The Regulatory Reform (Fire Safety) Order 2005

2 Fire (Scotland) Act 2005

3 The Fire Safety (Scotland) Regulations 2006

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- 2.8. In this guidance the FSO and FSA (and associated regulations) will be referred to as ‘the law’ except in instances where there are differing requirements. The term Responsible Person should be considered interchangeable with Duty Holder unless specifically stated.
- 2.9. The general approach is the requirement for an appropriate person to carry out a risk assessment, record significant findings and carry out identified preventative and protective actions to prevent serious injury.
- 2.10. Fire safety management should be seen as a continuum from design to demolition. New or altered buildings should conform to relevant building Regulations⁴, intended to ensure that the building is safe for occupation for the design purpose.
- 2.11. This guidance document will assist Light Rail systems to maintain the premises, when occupied, in a safe manner. It will help identify when changes to the layout or use should be recognised as relevant and consider the impact on fire safety. This document will also detail steps to be taken to maintain fire precautions that are provided and other management responsibilities such as staff training.

How Government Published Guidance Fits Alongside the FSO / FSA

- 2.12. The most relevant government published guidance is the “Fire Safety Risk Assessment: Transport Premises and Facilities”⁵. This guide applies to England and Wales only, however, the advice is generic and applicable to all parts of the United Kingdom. It does not set prescriptive standards, but provides recommendations and guidance for use when assessing the adequacy of fire precautions in the premises and facilities. Other fire risk assessment methods may be equally valid to comply with fire safety law. The guide also provides recommendations for the fire safety management of premises. The Scottish Government publication “Practical Fire Safety Guidance for Existing Non-residential Premises”⁶ provides generic information covering the same general headings.
- 2.13. The fire safety measures described in the guides are principally benchmarks. When deciding what fire safety measures are appropriate for premises, these benchmarks can be used as a comparison against what exists in the premises. The benchmarks should not be applied prescriptively to premises as they are not minimum standards nor are they provisions that are deemed to satisfy the legislation. In each case, the measures adopted should be risk appropriate for the particular circumstances in which they are applied. The assessment of risk needs to be specific to the individual premises.
- 2.14. Guides give an indication as to the measures that may be necessary to manage fire risk. British Standards also cover many areas of fire safety. Fire alarm systems and emergency lighting systems have specific standards relating to design, construction, provision and

4 Building standards technical handbook 2020: non-domestic Scotland / Building Regulations- Fire - 2: Buildings other than dwellings (England and Wales)

5 Fire Safety Risk Assessment - Transport premises and facilities

6 Practical fire safety guidance for existing non-residential premises Scotland

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testing. Other British Standards set out approaches to design, such as BS 9999: Code of practice for fire safety in the design, management and use of buildings⁷, intended for use by designers and architects. Relevant standards are signposted in this guidance document. Management activities set out in the standards are referenced where they are likely to be carried out by Light Rail staff.

- 2.15. Alterations or additions to buildings that impact on fire safety arrangements will require approval from a relevant building control body. Any changes to Light Rail premises that involve building work or changes of use should result in a reassessment of the fire safety arrangements.

Managing Fire Safety

- 2.16. A management commitment to fire safety is important to assist with achieving fire safety standards in premises and in maintaining a staff culture of fire safety. Key elements are the following, that are then covered in the subsequent sections of this guidance:
- Fire Safety Policy: defining who in the organisation is responsible and what they must do;
 - Emergency Fire Action Plan: what should happen in case of an emergency;
 - Fire safety information and training: how the building, the fire precautions and people are to be made and kept safe; and
 - Recording Information and keeping records.

⁷ Fire safety in the design, management and use of buildings. Code of practice

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3. Fire Safety - Trams

- 3.1. Trams are excluded from the scope of the FSO and the FSA, however, there is still potential risk from fire to Light Rail staff and passengers that should be recognised and managed. Therefore, each Light Rail system's procurement processes will ensure that suppliers provide assurance that vehicles meet relevant safety criteria and provide relevant information about compliance measures.
- 3.2. A Light Rail system's SMS should give regard to fire safety provisions in trams. In particular, fire safety procedures should be developed to cover the following areas:
- Emergency egress: access to exits, number, position and size of entrances and exits, width of entrances and exits, marking, positioning and operation of emergency exits;
 - Access and egress for persons with reduced mobility;
 - Fire extinguishing apparatus;
 - Emergency lighting;
 - Fire actions required by tram drivers / other Light Rail staff; and
 - Maintenance of seats and other furnishings.
- 3.3. In a comparable approach to the means of identifying and managing risk in buildings, Light Rail systems should carry out a Tram Emergency Evacuation Risk Assessment, which could apply to any situation requiring an emergency evacuation, including failure, accident, and fire. This risk assessment should consider the following:
- Types of evacuation (controlled and uncontrolled);
 - Location of evacuation: at platforms, away from platforms (worst case from height to floor), and considering specific hazards such as viaducts and tunnels); and
 - Orientation / condition of the tram (upright, derailed, overturned, on its side, damaged, etc.).
- 3.4. This risk assessment would inform the development of specific controls for all identified situations when an emergency evacuation might be required. This would assist with training staff and help support other emergency responders.

Access and Egress

- 3.5. Each tram design will have entrance and exit doors and, potentially, alternative escape routes via windows or other means. The Light Rail system's safety system should include the identification of these as well as any training or maintenance requirements to ensure that they work as intended when needed.
- 3.6. Tram running systems include raised kerbs at tramstops, to provide near level access for passengers. This is particularly important for those with reduced mobility. Light Rail systems' fire safety plans should consider situations where a fire breaks out between

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tramstops, to provide guidance and training for drivers to decide if there is a need or option to continue to the next stop to facilitate the evacuation of all passengers.

- 3.7. Trams have passenger alarm systems which enable a passenger to contact the driver in an emergency, so the driver will usually have some discretion in where they stop the tram, if this is necessary. In some incidents, the tram will be stopped out with the driver's control, so it could be at any location, so a Light Rail system has to consider evacuation from a tram away from a platform. Some trams carry ladders for emergency egress when away from platforms.

Fire Extinguishing Apparatus

- 3.8. Each tram will be provided with at least one portable fire extinguisher. This will generally be located somewhere that is easily accessed by the driver. Training for drivers should include instructions for the use of the type of extinguisher provided.

Emergency Lighting

- 3.9. Trams may be fitted with lighting that has an independent power source, intended to provide sufficient light in an emergency. This is to allow the location of emergency exits in the event of a primary power failure and reduce the potential for panic.
- 3.10. Where installed this must be tested in accordance with the manufacturer's recommendations.

Fire Actions Required by Tram Drivers / Light Rail Staff

- 3.11. Tram drivers / Light Rail staff will generally be aware of all activity in a tram and will be responsible for taking actions to prevent fires and to manage any foreseeable safety event.
- 3.12. Training for drivers / Light Rail staff should include the following:
- Enforcing the ban on smoking;
 - Identifying and dealing with dangerous passenger activities including fire setting;
 - The location and operation of emergency exits;
 - Identifying faults that need attention, including damage to items such as seats or furnishings; and
 - Actions in case of fire, including whilst underway between tramstops. Factors to consider when deciding either to stop immediately or proceed to the next stop.

Maintenance of Seats and Other Furnishings

- 3.13. Light Rail system's safety policies should include measures to ensure that seats and other furnishings are regularly inspected for tears or damage that exposes the filling. The fire resistance of such items could be comprised by the exposure of the filling.

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4. Assessment of Fire Risk in Premises – Requirements

- 4.1. Fire safety law applies to all premises used as workplaces. It is a legal requirement to assess the premises to identify risk to persons from fire and to apply fire safety control measures. The assessment of risk should be specific to fire safety and to the specific premises concerned. As such, a generic risk assessment will not be sufficient. The legislation requires that steps are taken to protect people from fire. It should be noted that property protection is not included; Light Rail systems may wish to consider insurers requirements and the impact of fire on business continuity as part of their risk assessment.
- 4.2. There is no defined period set by law for reviewing a fire risk assessment. This guidance is provided to help identify significant changes that require a review of fire safety arrangements and arrange for regular checks of premises to ensure that safety provisions are functioning appropriately.
- 4.3. A fire risk assessment must be reviewed:
- When significant changes to the layout, use or construction of buildings is planned or has taken place; and
 - On a frequency such that the safety provisions identified in this document are tested against current knowledge of fire risk relevant to the use of the premises. Facilities such as fire alarms and extinguishers must be tested to comply with relevant standards, the annual test is generally seen as the reasonable opportunity to consider the adequacy of the provision of those and other fire safety measures.

The Responsible Person

- 4.4. The following guidance applies to the responsibilities of the Responsible Person:
- One or more competent persons must be appointed. The number depends on the size and use of the premises and facilities, to carry out any of the preventative and protective measures required;
 - Staff must be provided with clear and relevant information on the risks to them identified in the fire risk assessment, about the measures in place to prevent fires, and how these measures will protect them if a fire breaks out;
 - Staff (and / or their elected representatives) must be consulted about nominating people to carry out particular roles in connection with fire safety and about proposals for improving the fire precautions;
 - Must ensure non-employees, such as temporary or contract workers, are informed of the relevant fire safety risks, and that they are provided with information about who are the nominated competent persons and about the fire safety procedures for the premises;
 - Must co-operate and co-ordinate with other Responsible Persons in the transport premises where relevant and inform them of any significant risks and the measures in place to reduce / control those risks that might affect the safety of their staff;

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- Must provide the employer of any person from an outside organisation who is working in the premises (for example, a contractor providing temporary staff) with clear and relevant information on the risks to those staff and the preventative and protective measures taken. Staff must be provided with appropriate instructions and relevant information about the risks to them;
- A non-employer in control of premises which contain more than one workplace is also responsible for ensuring that the requirements of the law are complied with in those parts over which they have control;
- Must consider the presence of any dangerous substances and the fire risk that this presents to relevant persons from fire;
- Must establish a suitable means of contacting the emergency services and provide them with any relevant information about dangerous substances;
- Must provide appropriate information, instruction and training to staff, during their normal working hours, about the fire precautions in the workplace, when they commence employment (induction training) and from time to time throughout the period that they are employed;
- Must ensure that the premises, facilities and any equipment provided in connection with firefighting, fire detection and warning, or emergency routes and exits are all covered by a suitable system of maintenance, and are maintained by a competent person so that they are in efficient working order and in good repair; and
- Staff must co-operate to ensure that the workplace is safe from fire and its effects, and they must not do anything that will place themselves or other people at risk.

Carrying Out a Fire Risk Assessment

- 4.5. Good management of fire safety is essential to ensure that fires are unlikely to occur, and then in the event they do occur they are likely to be controlled or contained quickly, effectively and safely. If a fire does occur and grow, everyone in the premises must be able to escape to a place of total safety easily and quickly.
- 4.6. Fire safety management is an organisational issue where the Responsible Person undertakes one role within the overall fire safety management process. This process relies on the practical knowledge of staff and their health and safety representatives in undertaking the many different roles and responsibilities required.
- 4.7. For most Light Rail premises, fire safety management will be managed as part of the SMS. The initial fire risk assessment must be carried out by a competent professional with the skills, knowledge and experience to make judgements about the appropriateness of the provisions for the risk posed. Guidance to assist in the selection of such a person is available from the London Fire Brigade⁸.
- 4.8. The key steps that need to be covered to carry out a risk assessment are set out below:

⁸ Guide to Choosing a Competent Fire Risk Assessor

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- Identify people at risk;
- Identify potential causes of fire;
- Evaluate the risk;
- Decide if existing fire safety measures are adequate;
- Formulate an Improvement Plan;
- Record the findings; and
- Review the assessment.

4.9. The risk assessment will help to ensure that the fire safety procedures, fire prevention measures and fire precautions (plans, systems and equipment) are all in place and working properly. The risk assessment should identify any issues that need attention. Health and safety representatives must be consulted on any issues arising from the risk assessment.

4.10. Fire risk assessment in the transport industry is often undertaken by specialists either in-house or brought in from external sources. Effective fire safety management, documented in a fire safety policy, should include the identification and implementation of the roles and responsibilities for the ongoing review and management of fire safety after the fire risk assessments have been completed. This is particularly important when the risk assessment will then be managed by local managers.

4.11. A fire risk assessment is an organised and methodical evaluation of the premises and facilities, the activities undertaken there and the likelihood that a fire could start and cause harm to those in and around the premises.

4.12. The aims of the fire risk assessment are set out below:

- Identify the fire hazards; (Hazard: anything that has the potential to cause harm);
- Reduce the risk of those hazards causing harm to as low as reasonably practicable; (Risk: the chance of that harm occurring); and
- Decide what physical fire precautions and management arrangements are necessary to ensure the safety of people in the premises if a fire does start.

4.13. If an organisation employs five or more people, the premises are licensed or an alterations notice⁹ requiring it is in force, then the following must be recorded. It is helpful to keep a record of the significant findings of a risk assessment even if this is not required.

- Significant findings of the fire risk assessment;
- Actions to be taken as a result of the assessment; and
- Details of anyone especially at risk.

4.14. Much of the information for the fire risk assessment will come from the knowledge staff, and others have of the transport premises and facilities, as well as information

⁹ Both the FSO and FSA contains clauses enabling an enforcing body to serve a notice requiring the enforcing body to be notified prior to specified alterations being carried out. These would be served in very limited circumstances.

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given by people who have responsibility for other parts of the premises. A tour of the premises will probably be needed to confirm, amend or add detail to initial views.

- 4.15. It is important to carry out a fire risk assessment, and / or a review of a fire risk assessment, in a practical and systematic manner. It must take the whole of the premises into account, including the exterior of the premises and outdoor facilities and operations. It should cover any rooms and areas that are rarely used or are unoccupied. If the premises are small, they may be able to be assessed as a whole. In some premises, it may be helpful to divide them into a series of assessment areas using natural boundaries, for example, public spaces (such as platforms) and back-of-house areas (such as offices, stores, staff amenities, etc.), as well as corridors, stairways and external routes.
- 4.16. If the premises are in a multi-use complex, then the information on hazard and risk reduction will still be applicable. However, any alterations to the use or structure of any individual facility will need to take account of the overall fire safety arrangements in the building. If the premises form part of a multi-use complex, then the measures provided by other occupiers may have a direct effect on the adequacy of the fire safety measures in other parts of the premises.
- 4.17. Health and safety law requires that a risk assessment is carried out in respect of any work processes presenting an identified hazard in the workplace and to take or observe appropriate special, technical or organisational measures to reduce the likelihood and severity of harm to the lowest level so far as is reasonably practicable. If the health and safety risk assessment identify these processes are likely to involve the risk of fire or the spread of fire, this will need to be taken into account during the fire risk assessment and actions prioritised based on the level of risk.
- 4.18. The Responsible Person must appoint one or more competent persons to carry out any of the preventative and protective measures needed. In large and complex transportation premises such as multi-mode interchanges, this person may be an appropriately trained full-time member of staff, for example, a duty / shift manager, station manager or, where appropriate, a third party. The fire risk assessment should demonstrate that, as far as is reasonable, consideration has been given to the needs of all relevant persons, including persons with special needs.

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5. Persons In / On the Premises

- 5.1. This section provides guidance on the process of determining the suitability of the fire safety provisions related to the occupancy of the premises. For buildings that have been designed and constructed in accordance with the relevant building Regulations, the fire risk assessment will be a means to confirm that the assumptions about the people likely to occupy the premises match the design expectations. A competent fire risk assessor should carry out that assessment. The person nominated to manage the premises should be aware of the relevant criteria, to enable recognition of significant changes that might cause the need for a review of the fire risk assessment.
- 5.2. As part of the fire risk assessment, the assessor will need to identify those at risk if there is a fire. This includes the following:
- Where people are working, either at permanent locations (for example, ticket counters, depots, control rooms), or at occasional locations around the premises; and
 - Who else may be at risk from a fire (for example, customers or other users of the facilities including visiting contractors and temporary staff), and where these people are likely to be located.
- 5.3. The assessment must consider all the people who use the premises, but should pay particular attention to people who may be especially at risk, such as the following. Further guidance can be found in LRG 8.0 Guidance in the Management of Vulnerable Persons.
- Staff who work alone and / or in isolated areas, for example, cleaners, security staff;
 - People who are unfamiliar with the premises, for example, new staff, visitors and intermittent use passengers;
 - Unaccompanied children and young persons;
 - People who may have some other reason for not being able to leave the premises quickly, for example, mobility-impaired or vision-impaired people, people with learning difficulties, elderly customers, people in a state of undress (staff changing rooms), pregnant women or parents with children;
 - People with pets and those with a responsibility for animal care;
 - People who are hearing impaired and people whose first language is not English, who might find audible alarms / messages difficult to understand; and
 - Other people in the immediate vicinity of the premises.
- 5.4. In evaluating the risk to staff with disabilities, a discussion may be required to help determine individual needs with those staff. In premises used extensively by the public, professional advice may be needed. The Disability Rights Commission can be a useful source of information.

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6. Reducing the Likelihood of Fire

- 6.1. An effective strategy should be in place to reduce the likelihood of a fire starting. At its simplest, this means separating flammable and combustible materials from ignition sources and ensuring equipment and installations are maintained. Premises managers should be able to identify changes that might cause the need for a review of the fire risk assessment.

Housekeeping and Storage

- 6.2. Good housekeeping will lower the chances of a fire starting, so the accumulation of combustible materials in premises should be monitored carefully. Good housekeeping is essential to reduce the chances of escape routes and fire doors being blocked or obstructed.
- 6.3. Managers should pay particular attention to the storage of materials in areas other than designated stores as well as seasonal activities, deliveries, accumulation of refuse, changes to marketing materials and signage all which may lead to increased fire loading or the obstruction of fire escape routes.

Storage and Use of Dangerous Substances

- 6.4. The primary intent of a fire risk assessment is to reduce the chance of a fire occurring. The fire risk assessment will identify dangerous substances present in the premises. Specific precautions are required when handling and storing dangerous substances to minimise the potential of an incident, however, every day materials such as paper and cardboard are combustible so should be considered if there are significant quantities present. Suppliers should be able to provide detailed advice on safe storage and handling, however, the following general principles will help reduce the risk from fire:
- Substitute highly flammable substances and materials with less combustible ones;
 - Reduce the quantity of dangerous substances to the smallest reasonable amount necessary for the operation of the business or organisation;
 - Store dangerous substances correctly, for example, in a fire-resisting enclosure. Ideally, all flammable liquids and gases should be secured, especially when the premises are unoccupied, to reduce the chance of them being used in an arson attack; and
 - Ensure that managers and staff are aware of the fire risk the dangerous substances present and the precautions necessary to avoid danger.
- 6.5. Additional general fire precautions may be needed to take account of the additional risks that may be posed by the storage and use of these substances. Particular attention must be paid to segregating incompatible substances. Certain substances and materials are by their nature highly flammable, oxidising or potentially explosive. These

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substances are controlled by other legislation in addition to fire safety law, in particular the Dangerous Substances and Explosive Atmospheres Regulations 2002¹⁰.

Safe Use of Equipment

- 6.6. All machinery, equipment and plant should be suitable for its application, be installed (and protected) in accordance with both the manufacturer’s instructions and the appropriate standard, and be properly maintained by a competent person. Appropriate signs and instructions on safe use of the equipment may be necessary.

Electrical

- 6.7. Electrical equipment is a significant cause of accidental fires in premises. The following are the main causes:
- Overheating cables and equipment, for example, due to overloading circuits;
 - Incorrect installation or use of equipment;
 - Lack of maintenance or testing of equipment;
 - Incorrect fuse rating;
 - Damaged or inadequate insulation on cables or wiring;
 - Combustible materials being placed too close to electrical equipment which may give off heat even when operating normally or may become hot due to a fault;
 - Arcing or sparking by electrical equipment; and
 - Embrittlement and cracking of cable sheathing in cold environments.
- 6.8. All electrical equipment should be installed and maintained in a safe manner by a competent person. If portable electrical equipment is used, including items brought into a workplace by staff (if this is permitted), then the fire risk assessment should ensure that it is visually inspected and undergoes portable appliance testing at intervals suitable for the type of equipment and its frequency of use.

Smoking

- 6.9. Carelessly discarded cigarettes and other smoking materials remain a major cause of fires. A cigarette can smoulder for several hours, especially when surrounded by combustible material.
- 6.10. In those areas where smoking is permitted, deep and substantial metal ashtrays should be provided to help prevent unsuitable containers being used. Disposal of cigarette ends should be undertaken at regular intervals and by a method that minimises ignition of a fuel and subsequent potential fire spread, for example, into a metal waste bin which is then taken outside. It is dangerous to empty ashtrays into plastic waste sacks which are then left inside for disposal later.

10 The Dangerous Substances and Explosive Atmospheres Regulations 2002

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- 6.11. Where smoking is not permitted there is the potential for illicit smoking. Managers should look out for signs of smoking in unauthorised (and potentially dangerous) places and take steps to deter such practices.

Managing Building Works and Alterations

- 6.12. Fires are more frequent when buildings are undergoing refurbishment or alteration. All proposed building work must be assessed for potential impact on existing fire precautions when in process and on completion. Attention must be given to any additional risks to people, particularly in those buildings that continue to be occupied. Lack of pre-planning can lead to haphazard co-ordination of fire safety measures.
- 6.13. The nominated premises manager should liaise and exchange information with contractors. This may be supported by the contractors' agreed work method statement. The designer should also have considered fire safety as part of the Construction (Design and Management) Regulations 1994, where the work falls within scope. Other building work that may be perceived as small and / or low risk may have the potential to have significant impact on fire precautions.
- 6.14. The premises manager should continuously monitor the impact of the building work on the general fire safety precautions, such as the increased risk from quantities of combustible materials and accumulated waste and maintaining adequate means of escape. Only the minimum materials necessary for the work in hand should be allowed within or adjacent to the building.
- 6.15. Activities involving hot work such as welding, flame cutting, use of blow lamps or portable grinding equipment can pose a serious fire hazard and need to be strictly controlled when carried out in areas near flammable materials. This can be done by having a written Hot-Work Permit for the people involved, whether they are staff or employees of a contractor.
- 6.16. Additional risks that can occur during building work include:
- Temporary electrical equipment;
 - Blocking of escape routes, including external escape routes;
 - Introduction of combustibles into an escape route;
 - Loss of normal storage facilities;
 - Fire safety equipment, such as automatic fire-detection systems, becoming affected;
 - Fire-resisting partitions being breached or fire doors being wedged open; and
 - Additional staff who may be unfamiliar with the premises.

Keeping Escape Routes Clear

- 6.17. Escape routes that may need to be used in an emergency may be routes that are used for general travel around a building or may be corridors or stairs provided specifically for that purpose. It is imperative that all routes are free from the risk of fire and from obstructions that might impede emergency evacuation.

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- 6.18. Items that are a source of fuel, pose an ignition risk, or are combustible and likely to increase the fire loading or spread of fire, should not be located on any corridor or stairway or circulation space that will be used as an escape route. Such items include the following:
- Portable heaters, for example, bottled gas or electric radiant heaters and electric convectors or boilers;
 - Gas cylinders for supplying heaters;
 - Cooking appliances; and
 - Unenclosed gas pipes, meters, and other fittings.
- 6.19. However, depending on the findings of the risk assessment and where more than one escape route is available, the items below may be acceptable if the minimum exit widths are maintained and the item presents a relatively low fire risk:
- Coat racks;
 - Non-combustible lockers;
 - Vending machines;
 - Small items of electrical equipment; and
 - Small quantities of upholstered furniture that comply with current furniture fire safety regulations.
- 6.20. Subject to the condition that they are placed or fixed in a manner that prevents obstruction to persons moving quickly in an emergency, including those using mobility aids.

Fire-Raising, Arson

- 6.21. Light Rail premises, particularly those open to the public, may be vulnerable to malicious fires or arson. Arson accounted for half of all fires attended in 2017/18 by FRS in the whole of the United Kingdom¹¹. This is the largest, single cause of fire attended by FRS.
- 6.22. Measures to reduce arson may include the following:
- Ensure the outside of the premises is well lit and, if practical, secure the perimeter of the premises;
 - Availability of CCTV cameras and security staff and presence of staff;
 - Restrict access to materials or areas of the premises where deliberate fires can be set;
 - Thoroughly secure all entry points to the premises, including windows and the roof, but make sure this does not compromise people's ability to use the escape routes;
 - Remove automatic entry rights from staff who have been dismissed;
 - Ensure that security alarm / fire-detection system is monitored and acted on;
 - Secure flammable liquids so that intruders cannot use them;

11 National Fire Chiefs Council - Arson

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- Remove all combustible waste regularly and ensure that any undergrowth around the site is cut down and removed;
- Do not place waste containers adjacent to occupied areas. Secure waste bins in a compound separated from occupied areas (this is particularly relevant when building work is in progress); and
- Do not store combustible materials such as pallets against the exterior walls.

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7. Restricting the Spread of Fire and Smoke

- 7.1. The second line of defence after the fire risk assessment is to help protect people should a fire occur and of this, is to restrict the spread of fire and smoke. The majority of people who die in fires are overcome by smoke. To evaluate the risk requires an appreciation of the way fires grow and how smoke can spread through a building. A fire in a building can generate smoke that is thick and black, obscures vision, causes difficulty in breathing, and can prevent persons from using escape routes.
- 7.2. Building Regulations set out requirements for new and altered buildings, the fire risk assessment will test the provision against the actual use.
- 7.3. The following sections will help premises managers to identify what provisions have been made and therefore, what needs to be maintained and taken into account if changes are being considered.

Layout of Premises

- 7.4. In some premises, the open design gives the potential for rapid heat, smoke or fire spread and exposure to occupants. In addition, openings in floors may allow smoke and hot gases to move from the fire source to areas occupied by people who may not be aware of the fire. Lack of containment potentially increases the number of people at risk from a fire.
- 7.5. Typical situations that may assist the spread of fire and smoke such as the following:
- Large roof cavities;
 - False ceilings, especially if they are not fire-stopped above walls;
 - Vertical shafts, for example, lifts, open stairways, dumb waiters or service risers;
 - Voids behind wall panelling;
 - Unsealed holes in walls and ceilings where pipe work, cables or other services have been installed; and
 - Doors, particularly to stairways, which are ill-fitting or routinely left open.
- 7.6. In premises that are open plan and have large floor areas there may be few restrictions to limit the spread of fire and smoke. Consequently, the movement of fire and smoke may result in the following:
- Be faster than anticipated;
 - Impact upon a large number of users of the facility; and
 - Affect the availability of designated escape routes.
- 7.7. This may be a significant factor in those facilities in which a void connects open mezzanine floors and gallery levels.
- 7.8. Notwithstanding the above, the risk from fire and smoke spread may be reduced if precautions are already in place that seek to limit the spread of fire and smoke. For

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example, the tall roofs and large compartments (and potentially smoke control systems) found in many public concourses help to ensure that the escape routes are kept clear from smoke. Additionally, the strict control of materials helps limit fire spread.

Fire Separation and Compartmentation

- 7.9. Many buildings are divided into different areas by fire doors and fire-resisting floors, ceilings and walls. These are partly designed to keep a fire within one area, giving people more time to escape. The fire risk assessment will identify which doors, floors, ceilings and walls in a building are required to be fire-resisting, to give time for people to escape should a fire occur. The premises manager should be aware of the fire compartmentation lines. A simple line drawing is particularly useful for this purpose.
- 7.10. High-risk areas (for example, plant rooms, machine rooms, store rooms containing explosive or highly flammable materials and areas set aside for storing combustible refuse) should be separated from the rest of the premises by appropriate fire-resisting construction.
- 7.11. If a wall is fire-resisting, then it is usual practice that any doors in it will also need to be fire-resisting. If a wall, floor or ceiling is required to be fire resisting then no holes should be made in it, (for example, for pipe ducts), without consulting a competent person. Any fire-resisting doors should be appropriately marked "*Fire Door – Keep Shut*" or locked as appropriate, and fitted with a self-closing device where necessary.

Smoke Control and Ventilation Systems

- 7.12. These are complex systems that are provided for saving the lives of occupants and giving assistance to firefighters and property protection by clearing hot smoke and gases from the building. The fire risk assessment should identify if such systems are installed, and the premises manager should understand how they operate and ensure that they are maintained in full working order. A system may be part of a larger system covering other premises in a building, and if so, the premises manager must liaise with other occupiers and building managers.
- 7.13. The smoke control system should be maintained by a competent person who is familiar with the fire engineering performance specifications of that specific system. Where these systems are installed in addition to a sprinkler system, the design and installation of each system should not act detrimentally to one another. A competent fire risk assessor should confirm this.

Fire Resisting Doors

- 7.14. Effective fire-resisting doors are vital to ensure that the occupants can evacuate to a place of safety. Correctly specified and well-fitted doors will hold back fire and smoke, preventing escape routes becoming unusable, as well as delaying the fire spreading from one area to another.
- 7.15. Fire-resisting doors are necessary in any doorway located in a fire-resisting structure for example, in a wall separating fire compartments or protecting an escape route. Internal

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doors constructed of timber will give some limited protection against fire spread, but only a purpose-built fire-resisting door that has been tested to an approved standard will provide the necessary protection.

- 7.16. A fire risk assessment will identify the doors that need to be fire resisting. These should be marked with a sign, usually "*Fire Door – Keep Shut*" unless they are held open using a proprietary device attached to the fire alarm system, which is not to include the use of wedges or fire extinguishers.

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8. Provision and Means of Escape

- 8.1. Means of escape is the provision of safe escape routes for people to travel from any point in a building to an unenclosed safe area, and includes the measures to maintain those routes. The number and capability of people present will influence the assessment of the escape routes. The escape routes must be sufficient to enable the maximum number of people likely to use the premises at any time to safely escape.
- 8.2. Once a fire has been detected and a warning given, everyone in the premises should, if necessary, be able to move or be assisted away from the fire to a place of reasonable safety such as an enclosed protected stair or another fire compartment from where they should be able to continue to escape to an unenclosed safe area beyond the premises.
- 8.3. The fire risk assessment for a premises should consider the occupancy and the construction, the exits and routes being provided, to ensure that they are arranged and maintained so that all people can leave the building safely should a fire break out.
- 8.4. Premises managers and key staff should be aware of the evacuation plans and the routes and facilities provided.

Escape Routes

- 8.5. Building Regulations require designers to ensure that wherever a fire breaks out, people should be able to walk or be assisted to a place of safety. In small buildings the entrance door may be close enough from anywhere in the premises to be reached before any potential fire could develop and prevent people leaving safely. In larger spaces or areas of higher risk, there will need to be more than one way out. In multi-storey buildings there may be the need for more than one staircase. The critical point for the premises manager is that whatever is provided must be maintained and any significant changes must prompt a review of the fire risk assessment.
- 8.6. The following paragraphs give more detail about the arrangements, to help managers understand what is provided for fire safety. The arrangements indicated in a risk assessment are also predicated on the use of the spaces. Therefore, changes in risk of fire such as the commencement of storage of flammable materials, or in the nature of the occupancy, such as a change of use of a room to allow public admittance whereby people may not be familiar with the building are significant, and should result in the fire risk assessment being reviewed.
- 8.7. In addition to the distance to a place of safety, consideration must also be given to the ability for the number of potential users of a route to pass through in the time available. The design criteria for escape routes including the doors, stairs and passageways includes consideration of the width available and the direction of opening of doors.

Assembly Points

- 8.8. A fire risk assessment will identify the arrangements that are necessary to ensure that all relevant people are able to reach a place of safety in the event of a fire. In many

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cases, this will include the identification of safe places outside of a building, where displaced persons can assemble safely should they have to leave the building in the event of an emergency. Where necessary, these assembly points may be marked with signs, including identifiers (for example, "Assembly Point A") to help communicate information such as the location of specific displaced persons.

- 8.9. Assembly points may be indicated on fire action notices. Staff should be aware of their location and may be required to direct or assist customers or others who are not familiar with the location to reach them.
- 8.10. When identifying suitable assembly points a number of factors should be considered, including the following:
- Whether the final exits of the building lead directly to a place of safety;
 - If the final exits lead into an enclosed area, such as an external yard, and occupants need to pass through further gates or doors to reach a place of total safety, these should open quickly and easily without the need for a key, and ideally in the direction of travel;
 - Whether the assembly point is large enough to accommodate all occupants at once;
 - The type of persons to be evacuated, including those at particular risk, such as people with mobility issues, how far they can be expected to travel and how they will reach the assembly point;
 - The route from the building to the assembly point, including the provision of sign-posts, artificial illumination and the condition of the traffic route;
 - Whether the assembly point needs to be illuminated;
 - The proximity of building service outlets, such as ventilation shafts that could allow smoke, heat or debris to escape and harm those in the evacuation area; and
 - Other hazards and factors unrelated to the building, such as the presence of live transport systems and large numbers of pedestrians passing through the assembly area.

Travel Distance

- 8.11. The Approved Documents to the Building Regulations and other publications include tables relating the maximum distance to be travelled, in one or more directions, according to the building use, height and other factors. The fire risk assessment will test that the design assumptions were accurate, if not, changes may need to be made, such as widening or adding exits. Physical changes to a building will generally require planning or building control approval, or both, the latter requiring plans indicating fire safety measures.
- 8.12. Managers should be aware that temporary changes can impact on the travel distances. For example, the loss of a fire exit or escape stair (internal or external) will change the distance and opportunity to reach a place of safety. Escape routes that are not used as common thoroughfares or those passing through areas not in the control of the Light Rail system, should be checked regularly to ensure that they remain available.

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- 8.13. In the majority of buildings, the means of escape has been based on limiting the travel distances that occupants have to travel to a place of safety. Whilst this approach may be appropriate for other premises, it is not always appropriate for some transport hubs, in where there are long platforms, underground facilities, airports, ferry terminals (long gates and piers) or tunnels. Many such facilities have escape distances far in excess of distances listed in some guidance documents, however, this does not necessarily mean that such a situation is unsafe.
- 8.14. Existing buildings and premises can be evaluated on the basis of records of previous evacuations, which may provide an indication of the adequacy of existing means of escape provision.
- 8.15. Alternative approaches can be adopted to satisfy the means of escape provisions, some of which are outlined below:
- Hazard management: reducing the flammable material available to a point where there is little to burn;
 - Aligning escape routes to reflect general circulation routes as occupants will generally use familiar routes (learned irrelevance);
 - The use of escalators under management control is a very effective method of moving a large number of occupants to a place of relative safety. In emergency conditions, escalators may be reversed in order to increase the available capacity for the means of escape;
 - Providing escape routes that are remote from each other to avoid them being rendered impassable by a single incident;
 - Providing artificial illumination of the paths of travel to aid way-finding and reduce evacuation time. Typically, emergency escape lighting is provided through battery or secondary power source, such as generators, which are activated on failure of the normal supply;
 - Stairs designed in accordance with the building Regulations provide easily negotiated inclines and are intended to minimise trips and falls on the stairs and have sufficient landings to avoid multiple falls;
 - Where escape stairs have the potential to be affected by smoke and / or hot gases from the fire, they could be pressurised or protected by lobbies to ensure their availability in an emergency; and
 - Providing fire and smoke control facilities (for example, sprinklers) to increase the time available for escape.
- 8.16. The adequacy of the means of escape provision can be improved by controlling the occupant load. This may require imposing limits on the numbers of persons through licence restrictions and / or through operational controls, for example, crowd management. The adequacy of alternative approaches will be determined by a competent fire risk assessor. Managers of premises that deploy these measures must be aware of the systems and safety critical elements.

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Mobility Impaired

- 8.17. Effective management arrangements need to be put in place for those who need help to escape such as the mobility impaired. Supplementary specialised guidance has been published such as Means of Escape for Disabled People¹² that indicates that suitable provision is to be made within the building to allow disabled occupants to move away from the fire to a place of relative safety.
- 8.18. The fire risk assessment will consider, and managers will need to be aware of, the following points where they are required:
- A refuge is a place of reasonable safety in which disabled people can wait either for an evacuation lift or for assistance up or down stairs. Disabled people should not be left alone in a refuge area while waiting for assistance to evacuate the building. Depending upon the design and fire resistance of other elements, a refuge could be a lobby, corridor, part of a public area or stairway, or an open space such as a balcony or similar place which is sufficiently protected (or remote) from any fire risk and which is provided with its own means of escape and a means of communication;
 - Where refuges are provided, they should be enclosed in a fire-resisting structure which creates a protected escape route which leads directly to a place of total safety and should only be used in conjunction with effective management rescue arrangements. The fire evacuation plan should not rely on the FRS to rescue people waiting in these refuges. Refuges should include two-way communications with the premises management and / or the FRS;
 - If firefighting lifts (provided in high buildings for firefighting access) are to be used for evacuation, this should be co-ordinated with the FRS as part of the pre-planned evacuation procedures;
 - Standard lifts may be considered suitable for fire evacuation purposes, subject to an adequate fire risk assessment and development of a suitable fire safety strategy by a competent person;
 - A disabled person, having reached a refuge, should be able to gain access to an alternative escape route;
 - Sufficient escape routes should always be available for use by disabled people. This does not mean that every exit will need to be adapted. Staff should be aware of routes suitable for disabled people so that they can direct and help people accordingly. Specialist evacuation chairs or other equipment may be necessary to negotiate stairs;
 - Plans should allow for the careful carrying of disabled people downstairs without their wheelchairs, should the wheelchair be too large or heavy. Safe manual handling procedures will need to be considered in addition to the dignity and confidence of the disabled person;
 - Stairlifts should not be used for emergency evacuation. Where installed in a stairway used for emergency evacuation, no parts of the lift, such as its carriage

¹² Fire Safety Risk Assessment - Disabled People - Means of Escape

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rail, should be allowed to reduce the effective width of the stairway or any other part of an emergency evacuation route; and

- Where ramps are necessary for the emergency evacuation of people in wheelchairs they should be as gentle as practicable. Guidance is given in the Building Regulations Approved Document M¹³. It should not be assumed that everyone who uses a wheelchair is not able to walk at all; some people may be able to walk enough to leave the building with assistance, and this should be provided by staff at the premises.

Inner Rooms

8.19. Where the only way out of a room is through another room, an unnoticed fire in the outer room could trap people in the inner room. This layout should be avoided as far as reasonably practicable. However, if this cannot be avoided, then adequate warning of a fire should be provided by any one of the following means:

- A vision panel between the two rooms providing adequate vision to give an indication of the conditions in the outer room and the means of escape;
- A large enough gap between the dividing wall and the ceiling, for example, 500mm, so that smoke will be seen; or
- An automatic smoke detector in the outer room that will sound a warning in the inner room.

8.20. In addition, the following points should also be considered:

- Restrict the number of people using an inner room, not to exceed 60;
- Access rooms should be under the control of the same person as the inner room;
- The travel distance from any point in the inner room to the exit from the access room should be restricted to escape in one direction only, unless there are alternative exits from the access room;
- No one should have to pass through more than one access room while making their escape; and
- The access room should not be an area of high fire risk.

Stairs

8.21. Stairways, if unprotected from fire, can rapidly become affected by heat and smoke, cutting off the escape route and allowing fire spread to other floors. However, if adequately protected, escape stairways can be regarded as places of reasonable safety to enable people to escape to a place of total safety.

8.22. In most premises designed and built to building Regulations and served by more than one stairway, it is probable that these stairways will be protected by fire-resisting construction and will lead to a final exit. If any floor has an occupancy of over 60, each storey should have at least two exits, that are protected routes. The figure of 60 can be

¹³ Building Regulations 2010 - Access to and Use of Buildings

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varied in proportion to the risk: lower risk slight increase, higher risk lower numbers of persons.

- 8.23. Potentially, some stairways will have no fire protection to them. In this case they are not designed for escape and are normally known as accommodation stairways.
- 8.24. Where a protected stairway is provided then it is essential that the level of fire protection is maintained. The benefit of protecting stairways from the effects of fire allows the measurement of travel distance from the furthest point on the relevant floor to the nearest storey exit rather than the final exit of the building.
- 8.25. If the building has floors which are occupied by different organisations, the fire risk assessment will consider the potential of a fire occurring in another part of the building over which the occupier may have no control and which may affect the protected stairway if allowed to develop unchecked. If the fire risk assessment shows that this may be the case and people using any floor would be unaware of a developing fire, then additional fire-protection measures may be required, for example, an automatic fire-detection and warning system. If this is identified by the fire risk assessment there will be a need to consult and co-operate with other occupiers and building managers.
- 8.26. Some stairways are provided with protected lobbies or corridors at each floor level, except the top floor. Although these are not generally necessary for means of escape in multi-stairway buildings of less than 18m high, they may have been provided for other reasons, for example, for firefighting access. In all cases protected corridors, lobbies and stairways must be kept clear of combustibles and obstructions.

Lifts

- 8.27. Due to the danger of the power supplies to a lift being affected by a fire, lifts not specifically designed as 'firefighting lifts' or 'evacuation lifts' are not normally considered acceptable as a means of escape. However, where a lift and stairway for a means of escape are incorporated into a fire-resisting shaft which has a final exit from it at the access level and the lift has a separate electrical supply to that of the remainder of the building, then that lift, subject to an agreed fire risk assessment, may be acceptable as a means of escape in case of fire.
- 8.28. Lifts are housed in vertical shafts that interconnect floors and compartments; therefore, precautions have to be taken to protect people from the risk of fire and smoke spreading from floor to floor via the lift shaft. Such precautions may include the following:
- Separating the lift from the remainder of the storey using fire-resisting construction and access via a fire door;
 - Ensuring the lift shaft is situated in a protected enclosure which may also be a stairway enclosure; and
 - Providing ventilation of at least 0.1m² at the top of each lift well to exhaust any smoke.

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Door Fastenings

- 8.29. The fire risk assessment will identify escape route and door requirements. Managers should ensure that any exit door or gate which is required to be kept open while the public are on the premises should be provided with appropriate fastenings so that the door or gate is kept open.
- 8.30. Appropriate fastenings for the public are push bars and push pads; handles requiring a turning action, for example, should not be used on doors for the public. Doors used for a means of escape should be kept unlocked at all times when people are in the premises and in no case should a door be fastened so that it cannot easily and immediately be opened from the inside without the use of a key in such a way that it will not cause an obstruction.
- 8.31. If the door has to be kept fastened while persons are in the building, the fastening should be by means of a panic latch or panic bar (or similar) so that the door can be readily opened by pressure applied by persons within.
- 8.32. For structural reasons some doors may not open in the direction of the exit. These, and all collapsible, sliding or roller gates or shutters, should be locked (with a removable key) in the fully open position, at all times when the public are present. During such times, the key should be removed and kept in a secure place. If there are doors, gates, or shutters which need to be locked open, a notice or notices clearly visible on both sides of the door, gate or shutter (whether open or closed) should be prominently displayed. The notice should bear the words *"This door (gate, shutter, etc.) to be secured open when the premises are occupied"*.
- 8.33. Security fastenings such as chains, bars, padlocks or similar devices must be removed from all doors, gates and shutters on exit routes at all times the public are in the premises prior to the building being put to use. No removable fastening should be replaced until the public have left the premises and sufficient exits should remain available for staff who may be present.

Lighting

- 8.34. A fire risk assessment should determine the need for lighting that is backed up by a secondary power source, known as emergency, escape or secondary lighting.
- 8.35. The primary purpose of emergency escape lighting is to illuminate escape routes, but it also illuminates safety equipment. The size and type of the premises and the risk to the occupants will determine the complexity of the emergency escape lighting required. Single 'stand-alone' escape lighting units may be sufficient in smaller premises, and sometimes these can be combined with exit or directional signs.
- 8.36. The level of general illumination should not be significantly reduced by the sign. In larger, more complex premises, a more comprehensive system of fixed automatic escape lighting is likely to be needed. This will be particularly true in premises with

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extensive basements or limited natural lightning, or where there are significant numbers of staff and / or members of the public.

- 8.37. If there are escape routes that are not permanently illuminated by normal lighting, such as external stairs, then a switch, clearly marked "*Escape Lighting*", or some other means of switching on the lighting should be provided at the entry to those areas / stairs.
- 8.38. An emergency escape lighting system should normally cover the following:
- Each exit door;
 - Escape routes;
 - Intersections of corridors;
 - Outside each final exit and on external escape routes;
 - Emergency escape signs;
 - Stairways so that each flight receives adequate light;
 - Changes in floor level;
 - Windowless rooms and toilet accommodation exceeding 8m²;
 - Firefighting equipment;
 - Fire alarm call points;
 - Equipment that would need to be shut down in an emergency;
 - Lifts; and
 - Halls or other areas greater than 60m².
- 8.39. It is not necessary to provide individual lights for each item above, but there should be a sufficient overall level of light to allow them to be visible and usable.
- 8.40. Emergency escape lighting can be both 'maintained', that is, on all the time, or 'non-maintained', which only operates when the normal lighting fails. Systems or individual lighting units are designed to operate for durations of between one and three hours. In practice, the three-hour units are the most popular and can help with maintaining limited continued use of premises during a power failure (other than in an emergency situation).
- 8.41. Emergency escape lighting can be stand-alone dedicated units or incorporated into normal light fittings. There are highly decorative versions of these for those areas that demand aesthetically pleasing fixtures. Power supplies can be rechargeable batteries integral to each unit, a central battery bank or an automatic start generator.
- 8.42. To complement emergency escape lighting, people, especially those unfamiliar with the premises, can be helped to identify exit routes by the use of way-guidance equipment. Way-guidance systems usually comprise photoluminescent material, lines of LEDs, or strips of miniature incandescent lamps, forming a continuous marked escape route at lower level. These systems have proved particularly effective when people have had to escape through smoke, including for partially sighted people. They can be particularly

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useful in premises where they can provide marked routes on floors and in multi-storey premises, they can direct people to escape routes which are seldom used.

- 8.43. All emergency escape lighting systems should be tested regularly and properly maintained to an appropriate standard. Most existing systems will need to be tested manually. However, some modern systems have self-testing facilities that reduce routine checks to a minimum.

Signs and Notices

- 8.44. In small buildings with a simple layout, a few signs indicating the alternative exit(s) might be all that is needed. In more complex premises, a series of signs directing people along the escape routes towards the final exit might be needed.
- 8.45. Many people with poor vision are able to recognise changing or contrasting colour to provide them with visual clues when moving around a building. It may be sufficient to paint any columns and walls in a contrasting colour and to highlight changes in level by, for example, making the nosing to step and stair treads a contrasting colour. For people with no sight, a well-managed 'buddy system', continuous handrails, a sound localisation system (which helps people to move towards an alert sound) or the installation of more tactile aids may be appropriate.
- 8.46. People will usually attempt to leave premises by the same way that they entered. As these entrances in Light Rail and other public transport premises will then be the exits of choice, it follows that the other emergency exit facilities provided for the premises may not be fully utilised. For this reason, all available exits should be clearly indicated so that the public are aware that there are ways to leave the building other than by the doors which they used to gain admission. In addition, the provision of well sign-posted exits can give a feeling of security in an emergency situation.
- 8.47. Note that in most transport premises, the normal entrance and exits are not always signed as fire exits. For example, "*Way Out*" is sometimes used in exits for normal use. Exit signs should be clearly visible whenever the public, staff and / or contractors are present.
- 8.48. The presence of other signs in premises (such as advertising) can distract attention from, or obscure the visibility of, escape signs. This could affect people's ability to see and understand escape signs, particularly if there is an evacuation. Sight lines to escape signs should be checked to ensure they are visible from all viewing points.
- 8.49. Always ensure that escape signs are not overwhelmed. Escape signs should meet the following criteria:
- They should provide clear, unambiguous information to enable people to leave a building safely in an emergency;
 - Every escape route sign should, where necessary, incorporate, or be accompanied by, a directional arrow. Arrows should not be used on their own;
 - If the escape route to the nearest exit is not obvious then it should be indicated by a sign(s);

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- Signs should be positioned so that a person escaping will always have the next escape route sign in sight;
- Escape signs should be fixed above the door in the direction of escape and not be fixed to doors, as they will not be visible if the door is open;
- Signs mounted above doors and hanging signs should be at a height of between 2.0m and 2.5m above the floor;
- Signs on walls should be mounted between 1.7m and 2.0m above the floor;
- Signs should be sited at the same height throughout the escape route, so far as is reasonably practicable; and
- Signs should comply with BS 5499¹⁴, including the relevant pictogram to fit the function of the sign.

14 BS 5499: Safety Signs, Including Fire Safety Signs

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9. Fire Detection and Warning

- 9.1. If a Light Rail facility has areas where a fire could develop undetected, or where people work alone and might not see a fire (for example, a plant room or a remote retail store in a building), it may be necessary, depending on the risk, to install an automatic fire-detection and warning system. Otherwise, a suitable fire-warning system may be all that is required.
- 9.2. Unless the transport facility is small, such as a surface open-platform tramstop, then the facility may be required to have an electrical fire-warning system. A fire alarm suitable for the intended use for a building may have been installed during construction, to meet the requirements of the building Regulations.
- 9.3. The need for, and the type of, fire alarm will be dependent on the findings of the risk assessment. Typically, the fire alarm system will include the following:
- Manual (break-glass) call points at storey exit and final exit locations;
 - Electronic sirens, bells, and / or voice alarms (providing the warning messages); and
 - A control and indicator panel.
- 9.4. If for any reason a system fails, it must still be ensured that people in the premises can be warned and escape safely. A temporary arrangement, such as whistles or air horns, combined with suitably trained staff located in key positions (to ensure that the whole premises are covered) may be acceptable for a short period pending system repairs.
- 9.5. The fire warning sound levels should be loud enough to alert everyone, taking into account background noise. Any sound systems should be muted (automatically or manually) when the fire-warning system sounds. In areas with uncontrollable high background noise, or where people may be wearing hearing protectors, the audible warning should be supplemented with visual alarms.
- 9.6. Light Rail operator's premises will generally be occupied during daytime with staff present who are familiar with the building. Manual "*Break glass to operate*" fire alarm call points should be located close to final exit doors. Staff should be aware of the need to operate these if they discover a fire, to alert occupants in other parts of the building.
- 9.7. Automatic fire detectors, smoke and heat detectors, may be provided where there are areas that are not regularly occupied and where fire might develop unseen. These will generally be connected to a fire alarm panel. Nominated staff for each such building should be aware of the system, be able to read the fire panel and take appropriate actions generally to either investigate or call the fire service, as determined by the fire risk assessment.
- 9.8. Premises that are mainly outdoors, such as a majority of tramstops, will not generally need a fire alarm of any type as people present would generally see a fire so would not need a system to alert them.

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10. Means for Fighting Fire

- 10.1. Light Rail systems have responsibility for the provision of appropriate firefighting equipment, this will be confirmed by the fire risk assessment.
- 10.2. All Light Rail facilities should be provided with appropriate firefighting equipment, with the exception of tramstops that are effectively open-air structures. For the majority of premises, handheld fire extinguishers should be sufficient. However, at some larger or more complex premises, such as depots, it may be necessary to provide a suitable water supply for firefighting in the form of hydrants.
- 10.3. Managers should be aware that a change of use of a room or area might result in the need to review the provision of fire-fighting equipment.
- 10.4. It is also a management responsibility to check that all firefighting equipment is in the correct position and in satisfactory order before the premises are used by the public.
- 10.5. Appropriate staff should be trained in the use of all such equipment.

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11. Record Keeping

- 11.1. Keeping up-to-date records of the fire risk assessment can help manage the fire strategy for premises effectively and demonstrate how compliance with fire safety law is being achieved. It is recommended that fire safety records should be kept to demonstrate that the Responsible Person is complying with the requirements of the law.
- 11.2. Records should be kept for long enough for management to demonstrate that the programmed maintenance and staff training is carried out over a period of time. Even if there is no requirement to record the fire risk assessment, it can be helpful to keep a record of any co-operation and exchange of information made between employers and other responsible people for future reference.
- 11.3. In larger and more complex premises, it is best to keep a dedicated record of all maintenance of fire-protection equipment and training. Records should be kept in a specified place on the premises and include the following:
- Details of any significant findings from the fire risk assessment and any action taken;
 - Testing and checking of escape routes, including final exit locking mechanisms, such as panic devices, emergency exit devices and any electromagnetic devices;
 - Testing of fire-warning systems, including weekly alarm tests and periodic maintenance by a competent person;
 - Recording of false alarms;
 - Testing and maintenance of emergency lighting systems;
 - Testing and maintenance of fire extinguishers, hose reels, fire blankets, etc.;
 - Testing and maintenance of other fire safety equipment (if appropriate);
 - Training of relevant people and recording of fire evacuation drills;
 - Policy, planning, organising, implementation, monitoring, audit and review;
 - Maintenance and audit of any systems that are provided to help the FRS;
 - The arrangements in a large multi-occupancy building for a co-ordinated emergency plan or overall control of the actions to take if there is a fire; and
 - All alterations, tests, repairs and maintenance of the fire safety systems, including passive systems such as fire doors.
- 11.4. Other issues that may be recorded include the following:
- Competence, qualifications and status of the persons responsible for carrying out inspections and tests;
 - Results of periodic safety audits, reviews, inspections, tests, and any remedial action taken;
 - All incidents and circumstances which had the potential to cause accidents and monitor subsequent remedial action; and
 - A record of the building use, the fire prevention and protection measures in place and high-risk areas.

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- 11.5. Records must be maintained that relate to fire-protection products and related services. Third-party certification schemes for fire protection products and related services are an effective means of providing the fullest assurances, offering a level of quality, reliability and safety that non-certificated products may lack. This does not mean goods and services that are not third-party approved are less reliable, but there is no obvious way in which this can be demonstrated. Third-party quality assurance can offer comfort both as a means of providing assurance that the goods and services purchased are fit for purpose, and as a means of demonstrating compliance with the law. However, to ensure the level of assurance offered by third-party schemes, checks should be made to ascertain if the company sub-contracts work to others. If they do, there will be a need to check that the sub-contractors are subject to the same level of checks of quality and competence.
- 11.6. Consideration should be given to ensure that no other management decisions or policies compromise fire safety. Relevant documentation should be available for inspection by representatives of the enforcing authority.

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12. Training

- 12.1. The importance of training cannot be overemphasised. Almost all of the physical fire precautions could be negated if staff do not act appropriately, by neglecting or even overriding safety provisions or by their actions if an emergency occurs. All staff should receive basic fire safety induction training and attend refresher sessions at pre-determined intervals to maintain their level of knowledge and competence for the roles and duties they undertake for the fire safety arrangements of the premises.
- 12.2. All staff and contractors must be told about the emergency fire evacuation plan and shown the escape routes. Staff training should take account of the findings of the fire risk assessment and be easily understood by all those attending. It should include the role that those members of staff will be expected to carry out if a fire occurs. This may vary in large premises, with some staff being given a particular role for which additional training will be required.
- 12.3. All staff should receive training about the following:
- Actions set out in the emergency fire action plan;
 - The importance of fire doors and other basic fire-prevention measures;
 - Appropriate use of firefighting equipment (where this is relevant);
 - Importance of reporting to the assembly area;
 - Exit routes and the operation of exit devices, including physically walking these routes;
 - General matters such as permitted smoking areas or restrictions on cooking other than in designated areas; and
 - Assisting disabled persons where necessary.
- 12.4. Training is necessary in the following circumstances:
- When staff start employment or are transferred into the premises;
 - When changes have been made to the emergency plan and / or the preventive and protective measures;
 - Where working practices and processes or people's responsibilities change;
 - To take account of any changed risks to the safety of staff or other relevant persons;
 - To ensure that staff know what they have to do to safeguard themselves and others on the premises;
 - Where staff are expected to assist disabled persons; and
 - Where a member of staff takes on the role of Duty Holder.
- 12.5. Training should be repeated as often as necessary and should take place during working hours.

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- 12.6. Whatever training is determined to be necessary to support the fire safety strategy and emergency plan, it should be verifiable. Enforcing authorities may want to examine records as evidence that adequate training has been given.
- 12.7. Where safety staff from an outside agency are on duty, steps must be taken to ensure that such staff have been trained to carry out the duties and responsibilities assigned to them.
- 12.8. Individuals who do not form a recognised part of the safety management structure (such as some security guards, hospitality staff, ground staff and commissionaires etc) should not be counted among the safety staff. Such staff are given a general safety briefing on the means of escape, evacuation procedures and safety equipment.
- 12.9. Staff designated to undertake specific actions would require more comprehensive training. Their role may include the following:
- Helping those on the premises to leave;
 - Checking the premises to ensure everyone has left;
 - Using firefighting equipment if safe to do so;
 - Liaising with the FRS on arrival;
 - Shutting down vital or dangerous equipment; and
 - Performing a supervisory / managing role in any fire situation.
- 12.10. Training for this role may include the following:
- Detailed knowledge of the fire safety strategy of the premises;
 - Awareness of human behaviour in fires;
 - How to encourage others to use the most appropriate escape route;
 - How to search safely and recognise areas that are unsafe to enter;
 - The difficulties that some people, particularly if disabled, may have in escaping and any special evacuation arrangements that have been pre-planned;
 - Additional training in the use of firefighting equipment;
 - An understanding of the purpose of any fixed firefighting equipment such as sprinklers or gas flooding systems; and
 - Reporting of faults, incidents and near misses.

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13. Light Rail Fire and Rescue Emergency Management

Light Rail Systems Safety Management System (SMS)

13.1. The Railways and Other Guided Transport Systems (ROGS) Regulations 2006¹⁵ require that a Transport Undertaking or Infrastructure Manager may only operate if they have a SMS in place which conforms to the requirements of these Regulations.

13.2. ROGS requires the following in relation to the SMS as stated in Schedule 1, Paragraph 2(j):

...(the) basic elements of a Safety Management System (includes)... "provision of plans for action, alerts and information in the case of an emergency which are to be agreed with any public body, including the emergency services, that may be involved in such an emergency;".

13.3. Key elements of this section of an SMS should include the following:

- Emergency contact arrangements;
- Operator’s emergency incident strategic and technical support arrangements;
- Planning and preparedness training for relevant staff;
- Awareness and information provision to emergency services; and
- Testing of plans through simulation and exercises.

Fire and Rescue Service (FRS) Operations

13.4. The FSO and the FSA set out the roles and responsibilities of the relevant FRS. Each FRS will make arrangements to identify risks in its area and to prepare to respond to fires and other incidents. FRS are required to gather information that is likely to be required when discharging their emergency response duties. Scotland has one FRS, England and Wales FRS are divided into areas governed by specific Fire Authorities. Light Rail systems should be aware that they may need to liaise with more than one FRS.

13.5. Operational firefighters and incident commanders are supported through ‘National Operational Guidance’¹⁶ (NOG). Sections in NOG provide context and technical information to assist safe fire and rescue operations, including dealing with or working on trams and Light Rail systems.

13.6. Fire incident commanders will be familiar with the principles set out in The Joint Emergency Services Interoperability Principles¹⁷, the ‘JESIP’ framework.

13.7. Although the JESIP joint working principles are specifically relevant to emergency services responders, Light Rail staff involved in planning or responding should be made aware of them; they are highlighted below in Figure 13.1.

15 The Railways and Other Guided Transport Systems (Safety) Regulations 2006

16 National Fire Chiefs Council - Operational Guidance

17 Home - JESIP Website

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Figure 13.1: The JESIP Joint Working Principles



- 13.8. Firefighters receive training to deal with road and rail incidents and will be relatively familiar with tools and techniques to deal with fire or entrapments in road and rail vehicles. However, as fires and other emergencies involving trams occur infrequently, training of the relevant emergency service staff is important to help ensure that tram specific risks and control measures are identified and acted on.
- 13.9. In addition, the FRS should work closely with operating companies to ensure that safe systems of work are adopted at operational incidents. This will include adequate liaison, pre-planning, training and familiarisation. The following are example points to include in this familiarisation:
- Vehicle jacking points;
 - Inbuilt safety features such as battery and pantograph isolation points; and
 - The location and operation of any inbuilt systems.
- 13.10. Where the FRS have tram systems within their area, they should also seek to ensure crews are familiar with how to contact control rooms, remote power supply isolation, location identification systems and earthing procedures.

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13.11. The following points inform Light Rail systems about the FRS perspective and likely preparations for Light Rail incidents, providing context for each operator's SMS.

13.12. The generic key roles of the FRS at rail incidents are the following:

- Save life and carry out rescues;
- Fight and prevent fires;
- Manage hazardous materials and protect the environment;
- Mitigate the effects of the incident;
- Ensure the health and safety of fire service staff, other Category 1 and 2 responders¹⁸ and the public; and
- Safety management within the inner cordon.

13.13. When responding to incidents involving Light Rail, the FRS has strategic multi-agency responsibilities. These are additional and mainly complimentary to the specific fire and rescue functions that the FRS performs at the scene.

13.14. The strategic objective is to co-ordinate effective multi-agency activity in order to achieve the following:

- Preserve and protect lives;
- Mitigate and minimise the impact of an incident;
- Inform the public and maintain public confidence;
- Prevent, deter and detect crime; and
- Assist an early return to normality, or as near to it as can be reasonably achieved.

13.15. Other important common strategic objectives flowing from these responsibilities include the following:

- Participate in judicial, public, technical or other inquiries;
- Evaluate the response and identify lessons to be learnt; and
- Participate in the restoration and recovery phases of a major incident.

13.16. FRS should produce multi-agency response plans for incidents that cause disruption to major road networks. The plans should detail the emergency and recovery phase roles and responsibilities of each agency.

13.17. The FRS should undertake the following:

- Prepare Site-Specific Risk Information (SSRI) and emergency response plans for relevant transport networks and make them available to staff;
- Plan an appropriate predetermined attendance and initial response to incidents involving transport networks;
- Pre-plan with transport network managers and other responding agencies to reduce the impact of incident;

¹⁸ Civil Contingencies Act 2004 (legislation.gov.uk)

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- Establish processes with the relevant authorities for receiving and distributing current information on transport network changes, such as closures or restrictions;
- Use multi-agency exercises to test emergency plans and ensure FRS procedures; and
- Have systems in place to support the exchange of information between fire control rooms and the incident ground.

13.18. Incidents affecting the transport network will present challenges to responding emergency services. Some incident types will benefit from pre-planning, for example, establishing the location of access and rendezvous points (RVPs). Transport network incidents may also occur in remote locations, which may present significant difficulties for access and communication.

13.19. The following elements may affect the ability to make a safe and controlled approach to a transport network incident:

- Accuracy of the location: the information may be provided as a grid reference, but may be less accurate in the form of a last known location provided by a member of the public;
- Type of terrain: some types of terrain may be unsuitable for appliances; consideration should be given to alternative, perhaps longer, routes;
- Mode of transport wreckage: this may be obscuring or trapping casualties, cause damage to emergency services vehicles and may need to be preserved for accident investigation purposes;
- People: those uninvolved with the incident, especially in large numbers, may restrict access to the incident;
- Casualties may be:
 - Injured, disorientated or confused; or
 - Have wandered away from the incident; or
 - Be vulnerable if obscured by the accident wreckage or if there is reduced visibility.
- Fuel spillages: may be obscured if there is reduced visibility or if the spillage has occurred away from the transport infrastructure;
- Animals: may be involved, either unconfined on a transport network or confined in a mode of transport; and
- RVPs and strategic holding areas (SHAs) should be identified and communicated, if not pre-planned.

Incidents Impacting on the Strategic Road and Rail Network

13.20. The joint transport bodies and emergency services have published an aide memoire which is captured within the CLEAR principles¹⁹. These outline the roles and

¹⁹ 'Collision, Lead, Evaluate, Act, Re-open': CLEAR Roles and Responsibilities

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responsibilities of the key organisations involved in traffic incident management on the strategic road network, setting out a joint outcome.

- 13.21. These principles aim to improve the understanding of the priorities of each organisation and the collective joint working principles. This is intended to improve communications and collaboration, more effective incident management and a reduction in incident duration.
- 13.22. Further guidance in relation to Mainline / Heavy Rail is contained in 'Fire and Rescue Service Operational Guidance – Railway Incidents'²⁰.

Light Rail Specific Hazards

- 13.23. FRS training, based on NOG, will prepare operations to deal with incidents in common situations. Firefighters will be likely to have experience of rescues from general road vehicles. It may be necessary to seek specialist advice or assistance for making safe power systems and gaining access to a tram. Both areas would benefit from pre-planning, sharing of information and joint training exercises.
- 13.24. Light Rail systems should be alert to changes to operating systems and tram construction that could have impact on responder's actions.
- 13.25. Light Rail systems should nominate a lead person to liaise with relevant FRS, responsible for identifying significant changes and to receive feedback from FRS following incidents.

Overhead Line Equipment (OLE)

- 13.26. Light Rail systems should provide information to relevant FRS about the tram power system, in particular the hazards and means of making safe. The information should include the following points or similar to reflect the actual system deployed:
- OLE refers to the overhead wires and supporting infrastructure. Electricity is delivered to feeder stations, then distributed to substations along the railway, which then feed the OLE. The voltage may be between 550v to 1500v, for Light Rail vehicles, such as trams and metros. The rail vehicle obtains traction power by picking up electricity from the OLE via a roof-mounted pantograph;
 - Each OLE structure has an identification number, which can be useful when communicating the location of an incident to the Electrical Control Operator (ECO);
 - OLE, pantographs and all roof-mounted electrical equipment on trains are extremely dangerous. It may be fatal to go too close to them, or if direct or indirect contact is made with them. They should be treated as being live at all times, unless formally confirmed otherwise by the ECO; and
 - Each OLE structure has a cable connecting it to the running rail. This is known as a bond. Some bonds are coloured red and are dangerous if they become

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disconnected. They must not be touched, and should be reported to the rail infrastructure manager or railway incident officer (RIO), to ensure control measures are adequate.

- 13.27. OLE is under tension and therefore, if damaged, it could collapse and recoil with force, remaining electrically charged until safely isolated and earthed.

Battery Powered Trams

- 13.28. For any trams that use batteries as a power source, the FRS need to be aware of made aware of how to handle the vehicle in light of the batteries including any particular risks related to the batteries in the event of an incident, for example, if it has turned over, needs to be lifted and / or if any battery cells / casing may have been damaged including what they should not be placed in or near, for example water.
- 13.29. The FRS also need to be made aware of what the batteries are made of in relation to what fire extinguishment measures are suitable and suitable first aid treatments in particular to the batteries. Risk of thermal runaway. Any risks of thermal runaway and / or electrolyte contamination need to be highlighted.
- 13.30. The FRS need to be aware of where the batteries are located in / on the tram and the amount of energy potentially stored in the batteries and how much energy they can absorb, plus how the batteries should be handled, for example not to crush, puncture or expose them to physical shock or excessive vibration.
- 13.31. The FRS also need to be aware of any firefighting precautions including (not exclusively):
- What fire extinguishers can be used for small fires;
 - Particular instructions in relation to larger fires;
 - Any special firefighting procedures, for example breathing apparatus, protective clothing; and
 - Any particular hazards resulting from exposure to the substance / preparation, combustion and gas products.

Gaining Access to Provide Rescue To and From a Tram

- 13.32. The information in this section should be considered by the Light Rail system, then verified according to their vehicles, and then shared with the relevant FRS.
- 13.33. The preferred access route into vehicles during an incident is by using the doors. Most vehicles are fitted with door release mechanisms, which should be labelled and can be operated externally. If there are casualties involved in the incident, the requirements of medical responders may need to be considered when determining the most appropriate access method.
- 13.34. In the event of an incident that results in a tram lying on its side, access for rescues by cutting through the roof is extremely unlikely. Trams have a large amount of equipment on the roof that would impede access.

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13.35. In the case of a fire there should be sufficient exits to allow passengers to alight through the doors. In the event of an incident that renders the doors inaccessible, alternative methods should be considered, such as the following examples:

- Using the windows; and
- Creating openings in the body of the rail vehicle.

13.36. All trams are fitted with toughened glass windows. There may also be a film applied to the inside of some tram windows to protect passengers inside trams from being hit by projectiles which shatter the windows. The film would be very easy to cut through in an emergency if the window is smashed.

13.37. Using windows to gain immediate access to casualties may be a valid method. However, they are of limited value for ongoing operations as, for example, their limited size may not be sufficient when extricating casualties on stretchers.

13.38. In instances where a tram is on its side with one set of windows against the ground, the other windows will be above the head height of persons inside. There are windows at each end of the tram that may provide better access.

13.39. If the windows do not provide appropriate access, gaining entry by cutting through any part of the body of the tram will create similar difficulties as other large vehicles such as buses and trucks. There are no specific areas of a tram, other than the windows, that are easier to penetrate.

13.40. Further reading includes RAIB Report 'Overturning of a tram at Sandilands Junction, Croydon 9 November 2016'²¹ and 'Rail Accident Report Fire on prototype tram 611 at Blackpool 24 January 2007'²².

21 R182017_201022_Sandilands_v2.2.pdf (publishing.service.gov.uk)

22 R412007_071127_Blackpool.pdf (publishing.service.gov.uk)