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Fire and Rescue Service Operational Guidance

GRAs

generic risk assessments

GRA 4.1

Incidents involving
transport systems - Road

Archived 31 March 2020

Generic Risk Assessment 4.1

Incidents involving transport
systems – Road

October 2009

Archived 31 March 2020



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ISBN 978 0 11 754059 0

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SECTION 1

GRA 4.1 Incidents involving transport systems – Road

Scope

This generic risk assessment (GRA) is concerned with the hazards, risks and control measures that relate to any incidents attended by the Fire & Rescue Service (FRS) on roadways.

The FRS attend a large number of incidents involving roadways. The types of incident vary greatly but the majority involve fires and road traffic collisions.

Activities relating to roads that involve other more specific significant hazards, for example explosives, are covered in other GRAs in this series.

As with all GRA's this assessment provides a starting point for FRSs to conduct their own assessments within the context of local conditions and existing organisational arrangements.

Significant hazards and risks

The significant hazards that FRS personnel face when attending incidents on roads fall into a number of categories:

- moving traffic
- vehicles involved in fire
- vehicles involved in Road Traffic Collisions (RTCs)
- other stationary vehicles
- vehicle occupants, and other road users i.e. pedestrians
- vehicle cargo/contents
- the conditions on site
- equipment in use.

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Moving traffic

The significant risk presented by moving traffic is that of FRS personnel being struck by a moving vehicle; the severity of the outcome will be affected by the speed and the size of the vehicle.

The hazard of moving traffic is present at all incidents on roadways. The class of road involved will affect the type of vehicles encountered and their speed.

The numbers of vehicles on the road will vary depending on the location and the time of day.

On quiet roads there is the potential for vehicles to be moving more quickly than expected.

The potential for collision will be influenced by a range of factors, including:

Visibility – May be affected by weather conditions (e.g. rain) and topographical features (e.g. road bends and undulations).

Road conditions – May be affected by road type and traffic speed, presence of junctions, weather conditions, substances on the road surface such as oil, the presence of casualties or debris on road and airborne hazards such as smoke.

Failure of other road users to drive with due care – Can cause collisions with FRS personnel, cause other road users to take evasive action leading to further collision and/or additional accidents, all of which can impact on the original incident.

When dealing with incidents on high-speed roads (motorways or dual carriageways), working across the central reservation will present a significant hazard to FRS personnel, members of other agencies and the public. Particularly if this results in FRS vehicles being parked in the outside lane of the unaffected carriageway and appropriate measures to control traffic not being in place on both the affected and unaffected carriageways.

Vehicles involved in fires

The significant hazards presented by vehicles involved in fire include:

- heat, flames and hot surfaces
- collapse of load or vehicle
- smoke and products of combustion, some of which can be very toxic.

The characteristics of the vehicle construction, which may affect how the vehicle behaves in a fire situation, for instance the inclusion of metal alloys such as magnesium or aluminium (often used in engine blocks), which in a fire situation may react violently when water is applied.

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Projectile hazards from rapidly expanding components such as suspension members and hydraulic struts. Also in some situations wheels of LGV vehicles can present projectile hazards when overheated.

In some vehicles there is a further hazard presented by pyrotechnic flares designed for emergency use which can contribute to or start a fire.

Fuels, such as petrol diesel and Liquefied Petroleum Gas (LPG) are often carried in large quantities and can contribute to rapid development of a fire situation or explosion.

High voltage electricity, often found in electric powered Hybrid or “dual fuel” vehicles, can lead to burns or electric shock.

Supplementary restraint systems, such as air bags and seat belt tensioners that can operate with explosive force.

Hazardous materials used in the vehicle construction including Man/Machine Made Mineral Fibres (MMMFs), fluoroelastomers, sodium oxide and sulphuric acid.

Vehicles involved in Road Traffic Collisions (RTCs)

The significant hazards presented by vehicles involved in RTCs are as follows:

- possibility of fire
- sharp edges of panels or components caused by impact or by the actions of firefighters involved in the extrication of casualties
- broken glass and glass dust
- vehicle instability including falling/collapse of vehicles/components being lifted/manipulated etc. also movement of lorry cabs
- hazardous substances being carried and also fuel, lubricants, brake fluid etc can be released as a result of impact
- hazardous materials used in the vehicle construction such as MMMFs, fluoroelastomers, sodium azide, sulphuric acid etc
- high voltage electricity, often found in electric powered, or hybrid vehicles leading to the possibility of burns or electric shock
- catalytic converters, which operate at very high temperatures and take time to cool down
- supplementary restraint systems such as air bags and seat belt tensioners that can operate with explosive force.

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Other stationary vehicles

The significant hazard presented by vehicles not involved in fires or RTCs relates to the effect they have on emergency service personnel trying to gain access to the scene.

Stationary or slow moving vehicles may restrict access and increase the hazard of moving traffic by obscuring the view of those on site.

The manual movement of unoccupied vehicles by firefighters will present the risk of manual handling injuries.

On motorways, and dual carriageways the practice of allowing public use of the hard shoulder at congested times can lead to significant difficulties when a Road Traffic Collision (RTC) causes the lanes of a carriageway to be blocked. In particular, such use can hinder emergency services vehicles and make it difficult for them to approach from the direction of the normal flow of traffic.

If an incident occurs close to a railway level crossing there is a risk of stationary traffic tailing back across the crossing and obstructing the line, with the subsequent dangers.

Occupants of vehicles and pedestrians

The occupants of vehicles can create a number of significant hazards:

- When they are involved in a RTC and have been injured there is a possibility of a release of bodily fluids which could cause infection/illness to the rescuer.
- The manual handling of casualties, particularly in the confines of a vehicle cab or when located on a steep embankment can be a significant hazard.
- Occupants of vehicles, and pedestrians (whether injured or not) may interfere with operations and can sometimes be distressed or under the influence of alcohol or drugs. There is a possibility of violent assault.
- Dealing with traumatic events including serious RTCs can be a source of psychological stress for those involved in the rescue and recovery of casualties.

Contents/cargo of vehicles

The contents or cargo carried on vehicles can create a number of significant hazards:

- most vehicles carry materials that are in some way harmful
- any cargo that has to be removed will pose a manual handling hazard, and may be or become unstable
- in all cases there will be some sort of fuel that even if it is not involved in the fire will present some form of hazard due to its chemical or physical properties.

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Many vehicles are used to transport hazardous materials. The form of these materials and the hazards that they present vary significantly. The quantities involved depend upon the type of vehicle. The hazardous materials encountered will generally fall into the one of the United Nations' classifications listed below:

- Class 1 Explosives
- Class 2 Gases
- Class 3 Flammable liquids
- Class 4 Flammable solids
- Class 5 Oxidising substances and organic peroxides
- Class 6 Toxic and infectious substances
- Class 7 Radioactive materials
- Class 8 Corrosive substances
- Class 9 Miscellaneous dangerous substances and articles.

Contaminated sharps, such as hypodermic needles, may be present within the vehicle.

Some vehicles may be carrying animals which could represent biological hazards and the possibility of bites or kicks to FRS personnel.

Conditions on site

Some aspects of the site itself will present significant hazards in addition to those already described:

- slippery or uneven ground conditions that could lead to slips/trips and falls, this can be made worse if there is wreckage/debris on the floor
- poor visibility
- excessive noise
- toxic fumes from vehicle engines and generators used to run equipment
- features of the type of roadway involved, such as motorway crash barriers, steep embankments viaducts, and street furniture such as drain access covers
- weather conditions, extremes of hot or cold weather, rain or snow.

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Equipment in use

Working at incidents on roadways will often involve the use of specialist equipment. The type of equipment and the hazards involved will vary but typically may include:

- manual handling of heavy equipment
- potential injury caused by failure of equipment, causing collapse or sudden movement of loads under pressure
- cuts/nip/trap or entanglement hazards from moving parts of equipment
- excessive noise and/or vibration
- damage to high pressure hydraulic or pneumatic systems involved with cutting or spreading tools can cause soft tissue damage
- burns from hot components.

Key control measures

Pre-planning

An essential element of management of risk is pre-planning. The Integrated Risk Management Plan (IRMP) will identify FRSs' response standards in terms of equipment and operational personnel required for safe systems of work to be employed. IRMP should take account of national guidance including GRAs and will need to consider hazards and risks identified through the GRA process.

FRSs should have standard operating procedures and risk assessments in place for the full range of incident types they may attend, including arrangements with other FRSs and partner agencies.

Particular attention must be taken in pre-planning to the adequate control of other road users to ensure safe systems of work can be applied.

FRSs should collate information on the risks in their area and make site specific risk information available to all relevant personnel prior to and upon arrival at incidents. Such information may include:

- local road networks
- major route access points and the location/operation of water supplies and drainage systems
- familiarisation with roadways on or near a station's ground will help local crews take the fastest route to an incident and consider in advance the establishment of a safe working area appropriate to the incident type attended.

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It is important that procedures are in place to ensure that all personal protective equipment (PPE), appliances and equipment are appropriate for the use to which they are put and are properly tested and maintained.

On occasions, there can be difficulty in obtaining water supplies on roadways; services must take account of this and develop suitable control measures to address this problem where it arises.

It is also important that FRSs' procedures are based upon a realistic approach to the reliability of the information provided – such as vehicle placarding and packaging etc.

The FRS should have policies and procedures in place for attending incidents on high speed roads (motorways and dual carriageways). These procedures/policies should have particular regard to the carrying out of operations that may require personnel to cross the central reservation/barrier when either one or both of the carriageways is open to traffic.

In situations where an incident occurs on a motorway or dual carriageway, FRSs should have plans in place that allow crews to approach the incident on both carriageways in case access is not possible from one direction.

Training

FRSs must ensure that their personnel are adequately trained to deal with incidents on all types of roadways within their area.

All personnel operating on the road network should have received appropriate training in their role before undertaking duties. No FRS personnel should be deployed on the roads without proper equipment or training.

The contents of this GRA should be included in the development training for personnel who operate on the road network.

The training programme should include:

- knowledge, understanding of and the ability to apply legislation in respect of working on roads
- knowledge and understanding of the FRS working on roads procedures
- knowledge and understanding of vehicle construction and supplementary restraint/safety systems and the associated hazards and risks
- refresher training enabling staff to achieve and maintain the required levels within the national competency framework.

All training should be carried out with due regard to the training components of the Integrated Personal Development System and relevant national rolemaps.

Training records must be kept to provide an effective audit trail.

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Command and control

Adherence to incident command procedures is vital in ensuring the safety of personnel on the incident ground.

An ongoing review of systems of work should be used to identify any change in risk and implementation of suitable control measures for the chosen systems of work.

This should include the appropriate use of cordons and ensuring spans of control are maintained within the recognised ranges to provide suitable levels of supervision. Where possible safety officers should be used.

Incidents on roadways are usually attended by more than one emergency service and early liaison with other services should be undertaken to ensure a co-ordinated and safe response to incidents on roadways.

Personal protective equipment (PPE)

FRSs should ensure that appropriate PPE is available for those personnel who attend incidents on roadways; the PPE should comply with relevant standards and protect the wearer from foreseeable hazards.

Selection of appropriate PPE includes the need to take into account the following:

- the need for conspicuity, particularly in the vicinity of moving traffic
- the type of reflective clothing needed will be affected by the type of the road and the speed of traffic
- when deciding upon conspicuous clothing account should be taken of the effect of appropriate standards and the effect of Incident Command tabards worn in conjunction with it
- the possibility of infection/illness spread through contact with blood or other bodily fluids
- respiratory protection will need to protect personnel from smoke and toxic gases as well as airborne particulates such as windscreen glass particles, MMMFs etc
- where necessary, there needs to be provision for additional PPE to protect personnel from specific hazardous materials
- roadway surface conditions can often be affected by the presents of debris, fuels, lubricants etc. Suitable footwear will help reduce the likelihood of slips/trips and falls
- appropriate eye protection is necessary; this needs to take account of the possibility of impact hazards as well as blood-borne infections
- suitable hearing protection must be available and worn when needed
- there is often a possibility of contaminated sharps such as hypodermic needles. Service procedures should take account of these factors and the PPE supplied should provide adequate protection.

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In RTCs sharp end protection kits can provide general protection for crews.

All PPE should meet the relevant national or European standard for its design and capabilities.

Safe systems of work

All of the above control measures will contribute to the creation of a safe system of work. There are a number of other factors that should be taken into account.

When working on roads it is possible and reasonable to arrange for the road to be closed, this will lead to enhanced crew safety.

It will be necessary to have procedures in place for consulting with the Police and Highways Agency etc to make decisions on whether a road can be closed and/or alternative measures can be adopted

Incidents on roadways often involve joint agency working; safe systems of work need to include procedures to ensure the safety of other agencies on the scene, particularly if their presence is required in the inner cordon.

A Memorandum of Understanding with agencies such as the Police and Highways Agency will help in the management of emergency situations and improve the warning to other road users through methods such as fixed electronic signage

All services need to have procedures in place allowing personnel to work safely on all types of roadways in respect of moving traffic. It is imperative that these procedures are also applied at the local level. This may include some method of marking the scene of operations with cones and warning signs, as well as arranging for attending appliances to provide those at work with an area shielded from traffic.

Where the placing of cones and/or signage is to be carried out by another agency (such as the Highways Agency) an appropriate MOU or similar agreement should be in place outlining the necessary procedures.

For incidents involving fires, firefighting procedures must be adopted including the use of breathing apparatus in accordance with the recognised national guidelines.

The FRS should have suitable policies and procedures in place to deal with incidents involving hazardous materials in accordance with the recognised national guidelines.

The FRS vehicle should be positioned so that it is not within any smoke plume or near hazardous materials.

Where the hard shoulder of the motorway is used as an extra lane, procedures need to be in place to allow emergency services to safely approach in the event of an incident.

The FRS should make provision to provide suitable lighting on the incident ground, when placing lighting consideration should be given to its effect on other road users.

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The FRS should have suitable policies and procedures and training in place for dealing with violent or aggressive behaviour.

Where incidents on roads occur in the close vicinity of railways, in particular at level crossings, account must be taken of the precautions that should be taken to manage the additional risk this presents. Services must have arrangements in place to contact the railway owner. Further guidance can be found in the GRA relating to railways.

Technical references	
1	Control of Noise at Work Regulations 2005
2	Road Safety Act 2006
3	PPE Regulations 1992
4	Manual Handling Operations 1992
5	Dangerous Goods Emergency Action code list 2009
6	Fire & Rescue Services Act 2004
7	Workplace, Health Safety and Welfare Regulations 1992
8	Safety Representative and Safety Committee Regulations 1977 and Plus Health and Safety (Consultation with Employees) Regulations 1996(as amended)
9	Motorway incidents: Fire Service Circular, 11/1983: ACPO Guidance on Policing Motorways 2007
10	Fire and Rescue Service Manual Volume 2 - Fire Service Operations. Incidents involving rescues from road vehicles.
11	HSE, 8/91 Violence to staff: Leaflet IND(G) 69(L)
12	Fire Service Circular 14/2007, Tackling Violence at Work: Good Practice Guidance Document for Fire and Rescue Services

SECTION 2
Summary of GRA 4.1
Incidents involving transport systems – Road

Ref. No.	Task	Hazard	Risk	Persons at risk	Control Measures
1	All tasks on roadways	Moving traffic	Personnel can be hit by moving traffic	Operational personnel Members of public	Close roads where reasonably practical to do so Establish traffic management systems Establish cordons Park appliances in position to shield crews at work Use warning signs, lights and cones Crews to wear appropriate High visibility PPE
2	Extinguishing vehicle fires	Smoke, flames and toxic gases Reactive components, burning fuel etc.	Burns, inhalation of smoke or gases	Operational personnel Members of public	Safe approach Training Firefighting procedures and equipment PPE Respiratory protection Establish cordons
3	Extinguishing vehicle fires	Projectile hazards	Impact from projectile objects.	Operational personnel Members of public	Safe approach Training Firefighting procedures and equipment PPE to include suitable eye protection Establish cordons
4	Dealing with road traffic collisions				

Incidents involving transport systems – Road (continued)

Ref. No.	Task	Hazard	Risk	Persons at risk	Control Measures
5	Extinguishing vehicle fires	High voltage electricity	Burns and/or electric shock	Operational personnel	Training Electrical sources to be safely isolated where possible before commencing work Appropriate PPE
6	Dealing with road traffic collisions				
7	Extinguishing vehicle fires	Hazardous materials used in vehicle construction such as MMIMFs, fluoroelastomers, sodium azide, sulphuric acid etc	Injury/illness caused by toxic materials	Operational personnel Members of public	Training Provision of risk-critical information in relation to hazardous materials Adequate PPE to include respiratory protection and chemical protection where necessary Facilities for decontamination or disposal of PPE and equipment
8	Dealing with road traffic collisions				
9	All tasks on roadways	Stationary traffic	Stationary traffic causes obstructions, which restricts the view of moving vehicles and personnel working at the scene Incident close to/potential for traffic to tail back across level crossing	Operational personnel Members of public	Close roads where reasonably practical to do so, establish cordons Pre-planning to include procedures for situations where the hard shoulder is utilised as a traffic lane Contact Network rail/ railway owner
10	Extinguishing vehicle fires	Manual handling of casualties	Work related upper limb disorders, spinal injuries etc	Operational personnel	Manual handling training Manual handling risk assessments Suitable equipment
11	Dealing with Road traffic collisions	Manual handling of equipment			

Incidents involving transport systems – Road (continued)

Ref. No.	Task	Hazard	Risk	Persons at risk	Control Measures
12	Extinguishing vehicle fires	Handling casualties, risk of contamination/illness or infection from body fluids	Illness/injury caused by transfer of blood-borne pathogens	Operational personnel	Training for all aspects of this task including first aid procedures Adequate PPE to include suitable eye protection and respiratory protection Facilities for decontamination or disposal of PPE and equipment
13	Dealing with Road traffic collisions				
14	Extinguishing vehicle fires	Violent assault from passengers or other road users	Injury caused by violent assault	Operational personnel	Police assistance Close roads where reasonably practical to do so, establish cordons
15	Dealing with Road traffic collisions				
16	Extinguishing vehicle fires	Vehicle cargos, chemical, biological or explosive hazards	Various possible risks dependant upon cargo involved	Operational personnel Members of public	Appropriate response in line with relevant operational guidance Establish cordons
17	Dealing with Road traffic collisions				
18	All incidents on roadways	Site conditions, debris lubricants etc strewn around the incident ground.	Potential slip, trip fall	Operational personnel	Adequate lighting where necessary Close roads where reasonably practical to do so, establish cordons. Safety brief for attending personnel
19	All incidents on roadways	Weather conditions	Potential for hypothermia, and/or heat stress/exhaustion dehydration	Operational personnel	Adequate PPE to include weather protection Procedures to protect personnel from high temperatures/sunburn in sunny weather
20	All incidents on roadways	Road features, crash barriers, steep embankments etc.	Potential for slip, trip/fall difficult manual handling increasing potential for injury etc	Operational personnel	Pre-planning Provision of relevant risk-critical information

Incidents involving transport systems – Road *(continued)*

Ref. No.	Task	Hazard	Risk	Persons at risk	Control Measures
21	All incidents on roadways	Environmental conditions; noise, dust fumes etc.	Inhalation of airborne contaminants, hearing damage	Operational personnel Members of public	Risk assessment of equipment etc. Adequate PPE to be available on site including hearing protection dust masks etc. Establish cordons
22	All incidents on roadways	Use of equipment, nips/ entrapment, failure of equipment etc.	Cuts, bruises, fractures, crush injuries, potential amputation	Operational personnel	Training in all aspects including proper use of equipment hazard information, relevant procedures etc. Adequate PPE Suitable procedures in place to inspect, maintain and repair equipment
23	All incidents on roadways	Psychological trauma	Post traumatic stress disorder	Operational personnel	Debrief/counselling procedures for crews involved