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Hazard - Fire water run-off

Hazard Knowledge

During incidents, contaminated fire water can affect the environment through direct run-off into a water body, soaking away into the ground or by entering drainage systems. These systems may then transport pollutants in the firewater into rivers, lakes, estuaries and the sea, groundwater, or to sewage treatment works. Introducing a heated liquid into a watercourse is also a form of pollution because it may cause de-oxygenation or kill aquatic organisms. See Section 1.6, [Environmental Protection Handbook](#).



Control measure - Controlled burning

Control measure knowledge

Controlled burning is a defensive operational tactic to prohibit or restrict the use of extinguishing media on fires to allow the combustion process to continue uninhibited. UK law does not require fire and rescue services to extinguish fires. A controlled burning strategy may warrant consideration in certain circumstances, including protecting the environment, where the benefit from offensive firefighting does not outweigh the risks, or where available resources and media are insufficient to successfully resolve the incident.

This operational strategy can be employed to limit damage to the environment when it is not possible to contain polluted fire water, as it can minimise the risk to public drinking water supplies from fire water runoff. It may also benefit air quality through improved combustion and dispersion of airborne pollutants. It can be employed in conjunction with firebreaks as a firefighting technique when responding to fires in areas such as moorlands or heathlands.

It is essential to understand that this strategy may have adverse effects, such as hazardous gaseous by-products to form or increase. The balance of potential water and airborne impacts is one of the factors that should be taken into account before implementing the strategy. See Section 3.7, [Environmental Protection Handbook](#).

Controlled burn considered	Controlled burn likely to be inappropriate
Life or health is not at risk or a controlled burn will reduce risk to people	Life or health is at immediate risk or a controlled burn will increase risk to people
There is little chance of extinguishing the fire	There is a high chance of extinguishing the fire with minimal health or environmental impacts
Fighting the fire with other techniques could cause a significant risk to firefighters	The fire is likely to spread widely or to high-hazard areas
Property is beyond salvage	Important or valuable buildings are involved
Fire conditions, weather conditions and/or the local landscape are appropriate for minimising air quality impacts	Fire conditions, weather conditions and/or the local landscape are inappropriate
Fire water run-off could damage an area of high environmental sensitivity or value	Drainage from the site leads to an area of low environmental sensitivity or fire water is not polluting
Fire water run-off could affect drinking water sources or sewage treatment works	Fire water can be contained on-site or off-site

Incident commanders will decide whether to allow a controlled burn. Wherever possible, they should take specialist advice from hazardous materials advisers (HMA), environment agency staff, owners/occupiers and public health bodies. The decision should be communicated as appropriate, including to the public via the media if necessary.

A controlled burn strategy may be considered at any time during an incident. At incidents where it is expected that the fire will burn for some time it may be appropriate to use both controlled burn and extinguishing tactics. For example, using a controlled burn in the initial stages of an intense fire may result in lower concentrations and better dispersion of pollutants because of the high combustion temperatures as well as reduced run-off.

The technique of introducing an accelerated control burn, which may include the use of fire service positive pressure ventilation fans (PPV), can help to increase temperature and therefore decrease the combustion time.

However, with both controlled burn and an accelerated controlled burn, as the fire dies back and begins to smoulder, the pollutant levels in the smoke plume may increase, resulting in reduced dispersion of pollutants and lowering of the smoke plume and contents in the atmosphere. At this point an extinguish strategy could be used. Such a strategy would also give more time for fire water containment measures to be put in place.

Controlled burn strategies may apply to industrial or commercial premises processing or storing polluting substances but can also be useful to limit the effects of fires involving:

- Agricultural premises, for example barns or [BASIS \(Registration\) Ltd](#) stores
- Transport by road, rail, air or sea or hazardous and/or environmentally damaging materials in significant quantities

For sites falling under the [Control of Major Accident Hazard Regulations 1999](#) (COMAH), [The Environmental Permitting \(England and Wales\) Regulations 2010](#) and other relevant environmental legislation, fire and rescue services should liaise with site occupiers and environment agencies to establish situations where considering a controlled burn may be required as part of:

- An industry protection scheme such as the BASIS (Registration) Ltd scheme for agrochemical stores
- An incident response plan at a site regulated by environment agencies
- An environmental management system or as part of the risk management plan as an agreed environmentally best option

Certain buildings have a particularly high value, not just in rebuilding costs but also because of their architectural, cultural, historical or strategic significance. Although it is unlikely that a building of this type would be used to store significant quantities of hazardous or polluting substances, the health and environmental benefits of a controlled burn must be weighed against the value of the building when they do.

The decision to adopt a controlled burn strategy should be made following consultation with relevant agencies, for example:

- Environmental agencies
- Nature conservation bodies
- Public health organisations
- Local authority
- Highway agencies

See also: National Operational Guidance: [Environmental protection](#)

Strategic actions

Fire and rescue services should:

- Develop tactical guidance and support arrangements for the hazards that may be encountered and the actions to be taken for controlled burning
- Ensure that a controlled burn strategy takes into account both the event and post-event phase of an incident
- Make appropriate arrangements for mitigating pollution and informing the relevant environmental agency and, where necessary, the local population. Liaise with the appropriate agencies to establish air and water monitoring arrangements, both on and off site where necessary

- Identify pre-determined sites where a controlled burn strategy may be appropriate

Tactical actions

Incident commanders should:

- Consider a controlled burn strategy and communicate this to personnel and relevant authorities



Control measure - Containment

Control measure knowledge

The principle of containment whenever practicable and safe to do so is the preferred approach to managing incidents where polluting liquids or materials have been released or generated by on-site activities, including firefighting.

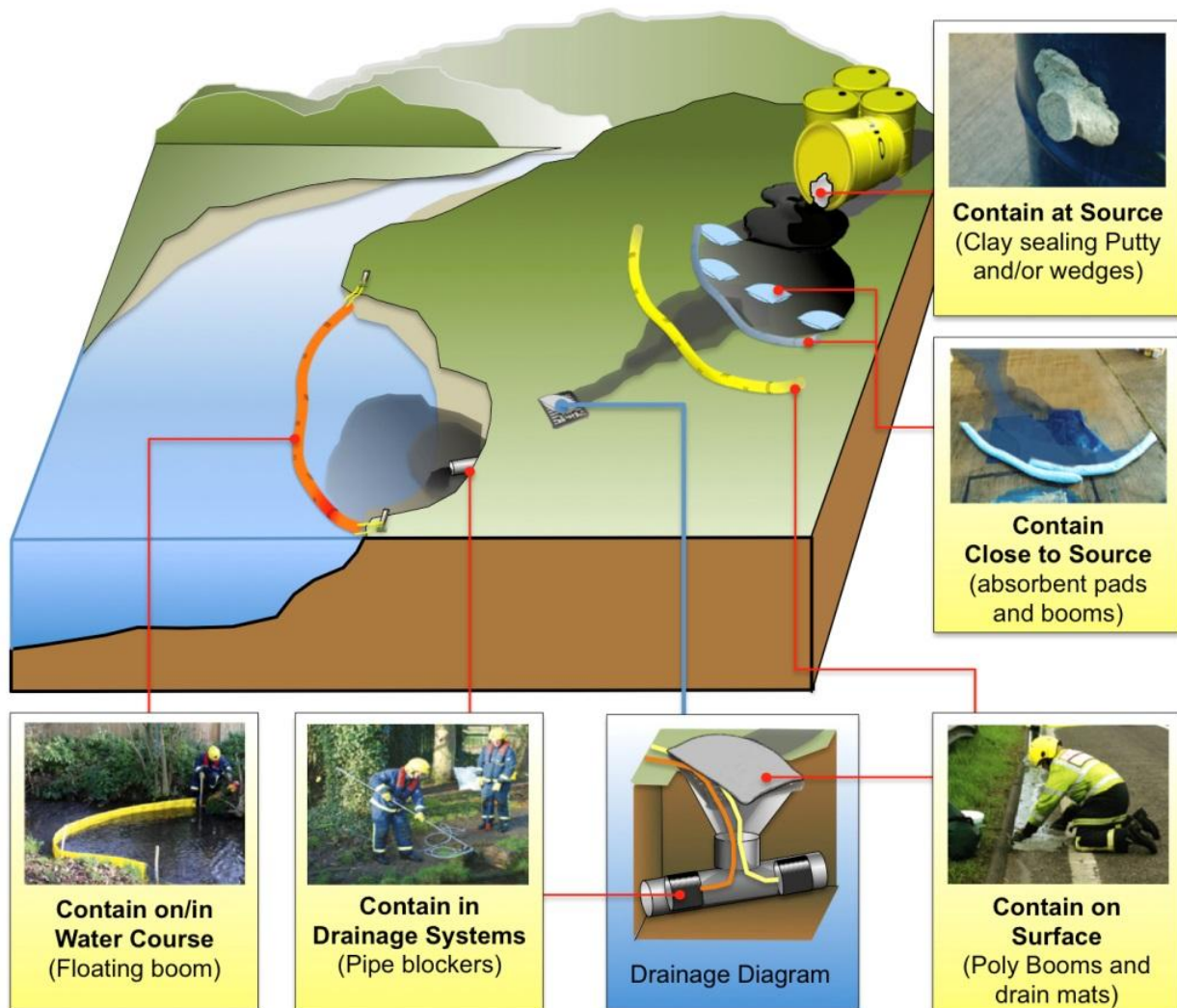
This hierarchy should be used in most instances when containing contaminated fire water run-off and spillages of polluting materials:

Hierarchy	Activity	Description
1	Containment at source	The most effective intervention point is where the source of pollution can be controlled to stop or reduce the volume released. Methods include the use of clay seal putty, leak sealing devices, wedges, and drums. Contaminated fire water will ideally be contained at an incident scene either inside the building or as close to it as possible.
2	Containment close to source	The next point of intervention is as close to the source as possible. This may be when it is not possible to contain at source or where there has already been significant loss of pollutant. Methods include the use of grab packs, booms and pop-up pools.

3	Containment on the surface	The most common way for contaminants to enter the environment is via drainage systems. Methods to prevent this include the use of booms, clay drain mats, pipe blockers, pumps, and flexi-dams.
4	Containment in drainage system	Pollutants may be contained in drainage systems if they have already entered the system. This can be carried out using in-built pollution control devices in the drainage systems such as oil separators, drain closure valves and containment lagoons/tanks and ponds. Such a system should allow predictable volumes of run-off to be stored, although allowance should be made for rainfall and how well systems have been maintained. Portable equipment such as pipe blockers can also be used.
5	Containment on or in watercourse	The deployment of booms on a watercourse downstream of an incident is of significant benefit where a pollutant floats. Damming can be used where pollutants are mixed or do not float but is normally restricted to small ditches and streams with low flows. Booms can also be deployed around drinking water intakes.

See Section 3.2, [Environmental Protection Handbook](#).

Pollution Hierarchy



Off-site containment is an alternative that can be considered by fire and rescue services. Foul sewerage systems can be used to contain polluting material if approved by the sewerage company and environment agency. When doing so take care that pollutants and sewage do not escape from any storm overflows into the sewerage system. The contained pollutants and sewage may then be removed.

It may also be possible to divert pollutants to a local sewage treatment works, where the pollutant can either be treated in the treatment process or contained in storm tanks before deciding on disposal. These tanks are present at many treatment works and are used to store the large volumes of diluted sewage produced during high rainfall. Approval from the sewerage company must be sought before diverting pollutants to a sewage treatment works because the treatment process can be affected if levels of pollution are too high. This would result in the release of both pollutants and untreated or partially treated sewage. See Section 1.66, [Environmental Protection Handbook](#).

Pollution control devices such as drain closure valves, storage lagoons or balancing ponds are

installed in some surface water drainage systems. These devices can be used to help contain pollutants if permission is given by the sewerage company, the owner/occupier or highway authority. In some places the environment agencies keep large volume pumps that can be used to support, supplement or replace fire and rescue service pumps.

Unless there is an immediate risk to life, containment measures can be used and advice and guidance from environment agencies should be sought before making any attempt to dilute. Never add detergent or any other cleaning products to spillages and never hose spillages to the drain without prior authority from the environment agencies and/or sewerage undertakers.

For further information see the [Environmental Protection Handbook](#).

Strategic actions

Fire and rescue services should:

- Develop procedures for containing fire water run-off
- Obtain sewerage information from local sewerage undertaker
- Consider the inclusion of drainage information in operational risk plans. See National Operational Guidance: [Operations](#)

Tactical actions

Incident commanders should:

- Minimise the impact of the incident and fire service actions on any identified environmental risk
- Consider the legal exemptions in relation to environmental protection i.e.
 - A discharge is made in an emergency to avoid danger to human health
 - All reasonably practicable steps were taken to minimise pollution
 - The relevant environment agency is informed of the incident as soon as possible
- Consider carrying out an [environmental risk assessment](#) to identify:
 - Site drainage
 - local surface waters and/or groundwater and vulnerability
- Attempt to control pollution using a Source – Pathway - Receptor model
- Consider availability of pollution control equipment and/or pollution containment facilities on site
- Establish the location of the nearest sewage treatment works, and whether it has the capacity to contain and or treat fire water run-off?

- Inform and/or seek advice from environment agencies and/or sewage undertakers where necessary
- Consider diverting water to holding areas or sacrificial areas that will not affect firefighting operations
- Identify potential drainage routes for fire water run-off and released vehicle content
- Consider future disposal options. See section [Disposal](#)
- Identify the location of motorway pollution control devices (PCD) and operate as necessary
- Communicate any risk to the environment to those attending the incident and relevant agencies



Control measure - Recycling

Control measure knowledge

Pumps can be used to recycle fire water at an incident. It is important that the act of recycling water does not make the situation worse. Consistent recycling of fire water run-off will increase the concentration of pollution, and the risk of spreading pathogens within recycled water spray. Incident commanders should make sure that the recirculated fire water is not harmful to either to personnel attending the incident or the local population.

Recycling water from mixed waste (household waste containing organic material, often nappies and food) should be avoided. For all other recycling sites (wood, plastic etc.) recycling the fire water run-off along with other tactics i.e. controlled burn presents a viable option to reducing damage to the environment.

Disposal of used recycled fire water may also present a problem for the fire service towards the end of an incident. Advice on continued use of recycled fire water run-off and its use and disposal of should be obtained from the:

- Relevant environment agency
- Public health body

- Tactical adviser
- Hazardous materials adviser

For further information see Section 3.2.8 [Environmental Protection Handbook](#).

Strategic actions

Fire and rescue services should:

- Have procedures for recycling fire water run-off
- Where appropriate, have procedures for testing pollutants in recycled fire water run-off. This maybe undertaken by:
 - Relevant environment agencies (biological and chemical sampling)
 - Sewage undertakers
 - Public health bodies
 - Alternative supplier/laboratories
 - Tactical advisers
 - Hazardous materials advisers/technical support teams

Tactical actions

Incident commanders should:

- Identify and assess the impact of the material on fire before the decision to recycle fire water run-off is made
- Consider the possibility of responders and the local population inhaling pollutants within recycled water vapour, based on their location and distance from the fire
- Carry out an environmental risk assessment and monitor the impact of tactics on the identified risk
- Consider the possible recirculation of fire water run-off, to reduce water used
- Consider the use of smooth bore branches to avoid blockages
- Recognise the potential contamination of equipment and PPE. See [National Operational Guidance: Operations](#)
- Consider hygiene. See [National Operational Guidance: Operations](#)

- Use false bottom dams or pools (made of plastic trays), containment tanks or lagoons to reduce the possibility of blockages from particles contained within water run-off
- Reduce the level of pollutants and debris in the firewater by replacing a proportion of the fire water each time it is recycled with fresh water
- Identify future disposal options. See [Disposal](#)



Control measure - Reduction

Control measure knowledge

The amount of water used can be reduced by using water sprays instead of jets and by using hand-held jets instead of ground monitors. This will reduce the amount of [fire water run-off](#).

Strategic actions

Fire and rescue services should:

- Consider maintaining a stock of hand controlled branches capable of producing a fire fighting jet and/or water spray at reduced levels of flow

Tactical actions

Incident commanders should:

- Consider identifying areas of operation where a reduced use water strategy can be initiated without significantly increasing the risk of fire spread or compromising safety
- Consider the impact of fire water run off on compacted materials and ground conditions
- Consider a controlled burn strategy. see [Controlled burn](#)



Control measure - Disposal

Control measure knowledge

During the early stages of an incident when the fire service activities are more dynamic, it may not always be possible to contain fire water safely. In these circumstances use of the foul sewer should be considered for disposal. The flow rate should be controlled to avoid the foul sewer overflowing. Failure to control the flow could result in polluting water entering the water environment. See [Fire water run-off](#).

At some incidents, the foul sewage system may be the best disposal option. If this is the case, the sewerage company must be contacted. They will consider the request and take account of the likely impact if they do not approve the discharge. Agreement from the appropriate environment agency must be obtained before any release takes place. This can be obtained by telephone but must be applied for and confirmed in writing later. See Section 1.6.6, [Environmental Protection Handbook](#).

For further information see Section 3.10.3 [Environmental Protection Handbook](#): The movement of hazardous waste by the fire and rescue service in emergencies.

For further information see Section 3.2.8 [Environmental Protection Handbook](#).

Strategic actions

Fire and rescue services should:

- Be aware of their legal responsibilities and possible defences for the disposal of fire water under the [Environmental Permitting Regulations 2010](#) and [Environmental Damage \(Prevention and Remediation\) Regulations 2015 \(EDR 2015\)](#)
- Develop plans for the disposal of contaminated fire water run off which include plans for:
 - Use off-site storage within drainage infrastructure e.g. balancing ponds
 - Use of foul water drainage
 - Contingencies for where the responsibility for disposal cannot be identified

Tactical actions

Incident commanders should:

- Ensure that waste products created by the fire and rescue service are disposed of both legally and responsibly. The [Environmental Permitting \(England and Wales\) Regulations 2010 \(EPR 2010\)](#) provides two exceptions for the emergency disposal of contaminated fire water runoff where the primary focus of fire and rescue service actions is saving life:
 - Emergency discharge and subsequent contamination of the water environment
 - The removal of waste by fire and rescue services using fire and rescue service equipment or vehicles
- Consider the legal exceptions. see [Environmental Legislation](#)
- Ensure that the relevant environment agency is informed of the incident as soon as possible and is be involved in the decision to discharge
- Inform sewerage undertakers if discharge is to foul the water sewerage system
- Identify if the responsibility for disposal of waste produced at an incident can be delegated to a third party based on location, material and quantities involved. Namely:
 - Local authority - Playing fields, public open spaces, beaches and some roads
 - Landowner or owner / occupier - Private property
 - Highways agency - (Road Service in Northern Ireland) - Major roads
- Identify if there are any alternative methods of disposal:
 - Suitable site arrangements for a waste disposal
 - Tankering away the contaminated water
- Identify potential drainage routes for fire water run-off and released vehicle content
- Ensure that waste products created by the fire and rescue service are disposed of legally and responsibly



Control measure - Operational risk information plan

Control measure knowledge

Operational risk information plans are prepared in accordance with the [Fire and Rescue Services Act 2004](#) and focus on firefighter safety. The plans should also include information on pollution, prevention and control where a risk to the environment is identified at an incident.

For further information see:

- [DCLG operational risk information guidance](#)
- Section 2.2 and 2.3, [Environmental Protection Handbook](#)
- National Operational Guidance: Operations [Identify foreseeable risk](#)
- National Operational Guidance: [Incident Command](#)

Strategic actions

Fire and rescue services should:

- Include environmental risk information within operational risk plans

Tactical actions

Incident commanders should:

- Consider pollution prevention information contained within site specific risk plans when a risk to the environment has been identified in risk information
- Carry out an [environmental risk assessment](#)
- Implement the environmental protection measures identified in operational risk information
- Monitor the impact of fire and rescue service tactics on the identified environmental risk
- Identify operation and effectiveness of fixed installations and pollution prevention measures



Control measure - Site-Specific Risk Information (SSRI)

Control measure knowledge

Fire and rescue authorities must make arrangements to obtain necessary information for the purposes of:

- Extinguishing fires and protecting lives and properties from fires in its area (relevant fire and rescue service legislation for England, Scotland, Wales and Northern Ireland)
- Rescuing and protecting people from harm at road traffic collisions in its area (relevant fire

and rescue service legislation for England, Scotland, Wales and Northern Ireland)

- Dealing with any other emergency function other than fires and road traffic collisions in its area (relevant fire and rescue service legislation for England, Scotland, Wales and Northern Ireland)

UK legislation sets the requirement for site-specific assessment. Collating and disseminating SSRI involves a number of tasks:

- Selecting premises to be inspected
- Assessing the nature and magnitude of the risk
- Considering a proportionate response
- Recording significant findings
- Making sure information is available in a useable form

A site-specific assessment takes account of current legislation on inspection information and includes information on preplanning firefighting tactics.

Tunnels and underground structures

The planned operational response to underground incidents should be sufficient to allow relevant safe systems of work to be implemented.

During any construction process, it will be necessary to review the Site-Specific Risk Information (SSRI) and emergency response plans so that any changes that will affect the existing risk information and guidance can be reflected throughout the project.

Pre-planning should be carried out jointly with other responder agencies that have knowledge of the environment, including volunteer rescue and leisure groups.

Hazardous materials and environmental protection

Fire and rescue services should assess the hazards and risks in their area relating to hazardous materials. This may be site-specific, for example, a factory using acid baths, or it may be generic, for example the local road network carrying hazardous materials.

The plans should also include information on pollution, prevention and control where a risk to the environment is identified at an incident. Although each nature conservation site will have its own environmental damage risks which can be captured with individual operational risk plans, a set of generic action plans will also help to identify generic environmental protection action to be taken in the early stages of an incident. See Section 2.6.5, [Environmental Protection Handbook](#).

In addition to general site-specific information, the following should be considered:

- Dangerous Substances and Explosive Atmospheres Regulations (DSEAR)
- Manufacture and Storage of Explosives Regulations (MSER), enforcement notices, prohibition notices etc.)
- Notification and Marking of Sites (NAMOS) inspections and information
- British Agrochemicals Safety Inspection Scheme (BASIS) inspections and pre-plans

- The asbestos register
- Significant Control of Substances Hazardous to Health (COSHH) assessments
- Control of Major Accident Hazards (COMAH) plans and information
- CBRN(E) site-specific plans

Strategic actions

Fire and rescue services should:

- Develop criteria for the identification of sites requiring Site Specific Risk Information
- Support the generic information identified for foreseeable risks, which may include a programme to produce Site-Specific Risk Information - the following steps should be taken in achieving this:
 - Identify local sites and their risks
 - Gain local specialist advice from partner agencies and other organisations
 - Consider including salvage and/or disaster plans
 - Ensure that familiarisation visits and exercises involving such premises or sites are carried out
 - Produce suitable templates to record and capture the relevant information
 - Establish a delivery method to present the information in a clear and timely manner
 - Schedule reviews and audits for the validity and accuracy of such information
 - Embed a quality assurance programme
 - Ensure information is made available to operational personnel to help successfully plan for and resolve operational incidents
 - Identify specific operational knowledge, skills and understanding, which may need to be incorporated into local training plans
- Develop mutual understandings with building developers, owners and occupiers on the exchange of information about alterations to any parts of a building which may have effect on firefighting operations.
- Ensure communication systems are in place to inform relevant personnel, stakeholders and partner agencies.
- Develop systems and processes to embed a culture of risk information gathering, recording and communication.
- Consider the requirement for the provision of specific equipment and training in relation to buildings identified as specific risks within the area of the service.
- Collate and maintain risk information regarding hazardous materials sites within their area or neighbouring fire and rescue service areas where it is foreseeable that their personnel may be required to respond to hazardous materials incidents
- Include environmental risk information within operational risk plans
- Consider introducing operational risk information plans with environmental risk notes for sites of nature conservation that are more susceptible to environmental damage. Where appropriate these plans should include:

- Environmentally safe areas for deployments and movements of fire service resources
- Identification of areas that are susceptible to physical environmental damage.
- Ensure inaccuracies in risk information are resolved and systems updated post incident

Tactical actions

Incident commanders should:

- Ensure inaccurate information is identified and resolved and information systems are updated following the closure of an incident or following an inspection/site visit
- Access any operational or site specific risk information (SSRI) and confirm accuracy



Control measure - Emergency response plans

Control measure knowledge

The Civil Contingencies Act (CCA) places a responsibility on Category 1 responders to produce and have in place emergency plans, which may include procedures for determining whether an emergency has occurred.

There is a generic national framework for managing emergency response and recovery, irrespective of the size, nature and cause of an emergency. It also identifies the various tiers of single and multi-agency management, defining the relationship between them and a common framework within which individual agencies can develop their own plans and procedures.

For further information see [Emergency Response and Recovery Guidance](#) (England and Wales), [Responding to Emergencies in Scotland](#) and [Emergency Planning, Northern Ireland Fire and Rescue Service](#)

Strategic actions

Fire and rescue services should:

- Consider the roles and responsibilities of the fire and rescue service at emergency incidents when developing emergency plans
- Ensure that emergency plans are produced. Plans should be developed in consideration of

the following:

- Anticipation - horizon scanning for risks and potential emergencies
- Preparedness - a clear understanding of roles and responsibilities and how they fit into the wider, multi-agency picture
- Subsidiarity - managing operations and making decisions at the lowest appropriate level
- Direction - establishing a clear and unambiguous strategic aim and objectives
- Information - information management and appropriate preparatory measures being in place to build situational awareness and the development of a Common Recognised Information Picture (CRIP)
- Integration - multi-agency involvement, roles and prominence
- Co-operation - inclusive decision making processes, openness and mutual trust
- Continuity - using established experience, expertise, resources and relationships to manage and respond to emergencies in the usual way

Tactical actions

Incident commanders should:

- Access any available emergency response plan and implement appropriate predetermined actions