

Title:	Water rescue and flooding
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Synopsis:	This guidance describes the hazards, control measures and actions needed for managing water-related emergencies. A significant development in the guidance is the new tri-service model for survivability.
Published:	01/02/2016
Next Review Date:	01/02/2019
Status:	Approved
Version:	Second edition version one
Latest Position:	First edition version one published 24/06/2014 Second edition version one published 01/02/2016. Full revision following application of tactics. You are recommended to read this

National Operational Guidance – Water rescue and flooding second edition version one (ARCHIVED on 03-2018)

ARCHIVED

Introduction

Fire and rescue services (FRS) are increasingly called on to attend incidents involving flood water. They may involve the rescue or recovery of people and animals, and protecting infrastructure and the environment. This guidance describes the hazards associated with flood related emergencies, the control measures required and the actions that can be carried out to implement them.

The emergency services have been criticised in the past for delaying action at incidents with an apparent low risk of harm to personnel. It may not always be necessary to implement extensive control measures before taking action. Collecting the correct and relevant information from the time of the first call to a fire control room will help identify the correct level of initial deployment necessary to deal with the incident. In some situations, such as at low-risk bodies of water, a wading rescue by non-specialist first responders might be entirely appropriate. However, the water environment can be deceptive. There may be hazards that are not obvious and could place firefighters at risk. In deciding which control measures are appropriate to manage an incident safely, incident commanders will need to be mindful of potential hazards and their knowledge of flood phenomena. They will need to base their decisions on the balance of risks to personnel and members of the public.

Search and rescue responsibilities

The police are responsible for co-ordinating search and rescue (SAR) on land and on inland waters. The Maritime and Coastguard Agency (MCA), through HM Coastguard (HMCG), responds to rescues at sea, on the coastline, in tidal waters and in certain delegated inland waters.

HMCG's SAR teams have the following capabilities:

- Search
- Water rescue
- Mud rescue
- Rope rescue

HMCG and the police are able to call on various SAR assets, for example, fire and rescue services, lifeboats, helicopters, ambulance, cave rescue, mountain rescue, lowland SAR, etc. Fire and rescue services will often provide an initial and/or backup response in HMCG's statutory area of responsibility.

[The Department for Environment, Food and Rural Affairs \(Defra\)](#) is the lead government department for major flooding in England and Wales. However, responding agencies report to a range of government departments, requiring co-ordination in the event of flooding over a wide area.

Departments include:

- Pan-government co-ordination: Cabinet Office Civil Contingencies Secretariat (CCS)
- Fire and rescue and local government resilience: Department for Communities and Local Government (transfers to Home office on 1 April 2016)
- HM Coastguard: Department for Transport (DfT), as parent department for the MCA
- Police: Home Office (HO)
- Ambulance service: Department of Health (DoH)
- Forecasting: Department for Business, Innovation and Skills (BIS), as parent department for the Meteorological Office

- Military aid to the civil community: Ministry of Defence (MoD)

The ambulance service is responsible for the clinical care of casualties in the pre-hospital environment. It has a unique legal duty of care towards individual casualties from search and rescue activities that is not shared by other responding agencies. Hazardous area response teams (HART) have skills and equipment that enable them to work with rescue agencies and gain access to patients in the hazard zone. However, sometimes ensuring the safety of the ambulance crews (including HART) mean it would be safer for the patient to be brought to the ambulance service by other specialist providers. In these circumstances communication between the provider and the HART/ambulance crew should be maintained.

Fire and rescue service responsibilities

A fire and rescue authority's (FRA) statutory duties are set out in the Fire and rescue Services Act 2004, or equivalent legislation in devolved administrations. These duties are classified as:

Core duties

In England, fire and rescue authorities do not have a statutory duty to respond to water rescue or flooding incidents. The only possible exception is a road traffic incident involving water, which is a specified duty. Each fire and rescue authority has to decide their strategic direction via their integrated risk management plan (IRMP) and adoptive powers under the Fire and Rescue Services Act 2004 or the equivalents in the devolved administrations (see below). Strategic managers will consider their statutory duties and the foreseeable risk in their area to decide if they need a water rescue and/or flooding capability and the extent of that capability.

Emergencies

Under Section 9 of the Fire and Rescue Services Act the Secretary of State can extend the core duties of FRAs in England to deal with specified emergencies.

The term 'emergency' in the act means an event or situation that causes or is likely to cause:

- One or more individuals to die, be injured or become ill
- Serious harm to the environment (including the life and health of plants and animals)

Similar arrangements exist in the devolved administrations of Scotland, Wales and Northern Ireland.

The Fire (Additional Function) (Scotland) Order 2005 has extended the duties of FRAs in Scotland to include:

- Rescuing people trapped, or likely to become trapped, by water
- Protecting them from serious harm in the event of serious flooding in its area.

Adoptive powers

FRAs have powers to respond to other eventualities and provide other services under Sections 11 and 12 of the Fire and Rescue Services Act 2004. They can equip for and respond to events beyond their core functions. A FRA can act where it believes there is a foreseeable risk to life or the environment.

FRAs have the general power of competence under the Localism Act 2011. In effect, an FRA can choose to use its resources for any purpose that it sees fit.

Civil Contingencies Act 2004

Fire and rescue services take part in multi-agency planning for and in response to all types of civil emergency. They do so as Category 1 responders under the Civil Contingencies Act (CCA) via local resilience forums. These forums also provide the key point of focus for engagement with Category 2 responders and voluntary agencies.

Risk management planning

Risk management plans should consider the foreseeable hazards associated with the potential for flood incidents occurring and subsequent water rescue. For flooding, this assessment should identify areas where there is a history and knowledge of potential inundation and the location of the most vulnerable people and infrastructure. Using risk mapping techniques from a variety of sources, including local and resilience community risk profiles and national environment agency flood maps, can assist the process.

Assessments of flooding hazard should include:

- Local flood maps including flash flood areas and surface water mapping
- Specific hazards such as fords and flooded roads
- Hydrology
- Geographic and demographic areas of highest need (for example, vulnerable members of the community and critical infrastructure)
- Previous incident data
- Links to weather patterns and historical flood data
- Climate change impact assessments

Assessments of water rescue hazards should include the identification of existing bodies of water, particularly those used by the public for recreation, and information about the characteristics of each.

Responders should assess the hazards and develop appropriate control measures in their area. Site-specific plans should be considered for locations where these are significant and should include:

- Response levels that are flexible and scalable to allow for a variety of flood scenarios.
- Reference to relevant standard operating procedures
- Tactical considerations, including rendezvous points, appliance marshalling areas and access points
- The need for teams to be thoroughly familiar with local sites through a regular programme of structured training in realistic and testing conditions including poor weather and darkness

Hazard and control statement

The hazard and control statement lists the hazards that could reasonably be expected to be present for that specific subject area and a brief description of the controls that could be used to reduce exposure to or impact of each hazard.

Hazards	Control measures
Initial attendance and moral pressure to act	Make appropriate decisions- for rescue or recovery Water rescue and flooding training and maintenance of competence Implement appropriate search techniques Request police attendance

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	<p>Establish control zones</p> <p>Use appropriate techniques and equipment</p> <p>Maintain control of and provide support to the public including families of casualties</p> <p>Avoid entry</p> <p>Refer to Site-Specific Risk Information (SSRI)</p>
Person in water	<p>Use competent personnel</p> <p>Wear personal protective equipment</p> <p>Use team identification system</p> <p>Nominate and position upstream spotters</p> <p>Nominate and position downstream safety teams</p> <p>Use trained First Aiders, First Aid/Casualty care Equipment (Performing Rescues – Casualty Care)</p> <p>Remove casualties from water using appropriate personnel, techniques and equipment</p> <p>Implement underwater search and recovery protocols</p>
Slips, trips and falls (into water and/or from height)	<p>Minimise immersion hazards</p> <p>Identify hazardous areas</p> <p>Use of appropriate techniques and equipment</p> <p>Identify and implement emergency responders safe working zones</p>
Weather conditions	<p>Use effective planning and weather reporting systems</p> <p>Use shelter/protection from weather conditions</p>
Unstable or unsafe surfaces and areas	<p>Implement safe methods of working</p> <p>Establish safe methods of access/egress</p>
Waterborne contaminants	<p>Develop knowledge of contamination sources</p> <p>Use good hygiene practices</p> <p>Limit exposure using correct operational procedures</p> <p>Decontaminate people, PPE and equipment</p> <p>Develop knowledge of medical signs and symptoms</p> <p>Develop inoculation programme and occupational health monitoring</p>
Flood water	<p>Plan for resilience and identification of hazards</p> <p>Refer to Defra concept of operations</p> <p>Develop rescue planning strategies</p> <p>Define the area of operations</p>

	<p>Use search and rescue cell search planning considerations</p> <p>Use safe working practices to deal with pets and animals</p> <p>Manage emergent volunteers</p> <p>Consult and liaise with the Fire and Rescue Service National Co-ordination Centre (FRSNCC)</p> <p>Use accreditation of flood rescue agencies</p>
Environmental impacts (biosecurity)	Use check, clean, dry procedure
Vehicle in water	<p>Stabilise and anchor the vehicle</p> <p>Use trained and equipped personnel in the hot zone</p> <p>Avoid entering the vehicle</p>
Other bodies of water or waterways	<p>Develop knowledge of terminology and operating systems</p> <p>Establish and implement procedures for surface rescue/recovery</p> <p>Establish and implement procedures for sub-surface rescue/recovery</p>

Initial attendance and moral pressure to act

Hazard	Control measures
Initial attendance and moral pressure to act	<p>Make appropriate decisions- for rescue or recovery</p> <p>Water rescue and flooding training and maintenance of competence</p> <p>Implement appropriate search techniques</p> <p>Request police attendance</p> <p>Establish control zones</p> <p>Use appropriate techniques and equipment</p> <p>Maintain control of and provide support to the public including families of casualties</p> <p>Avoid entry</p> <p>Refer to Site-Specific Risk Information (SSRI)</p>

Hazard knowledge

Responders will attend a range of incidents close to or in water. They may be first on the scene, responding alone or as part of a crew. Personnel will face difficult morally challenging situations and may have to make decisions in extremely hazardous, emotionally charged and fast moving environments. They may face an uncontrolled situation where hazards are not yet identified and information is incomplete. Water incidents may involve circumstances where the water is static or flowing, rising, shallow or deep. The water could be contaminated and very cold. Incident commanders should always ensure that they assess the hazards and take reasonable actions to bring the incident to a safe conclusion.

It is important that as much useful and relevant information is taken by fire control operators as possible and that this information is correctly and accurately passed on to the crews attending the incident.

When attending an incident the safety priorities are oneself, the team, the public and then the casualty. Firefighters need to ensure their own safety as well as the safety of others to be able to carry out a successful rescue. Firefighters may also be required to deal with members of the public recklessly attempting rescue.

In this guidance a submerged casualty describes someone who can't breathe because their airway is underwater. An immersed casualty is regarded as in the water but whose airway is clear.

Personnel can be confronted with situations outside their experience, or where there is incomplete or inaccurate information. They should also deal with the pressure to save or rescue someone when friends, family or other members of the public are trying to enter the water. This will add to the existing danger.

The first attendance may not be equipped with specialist water personal protective equipment (PPE). Attempting to rescue someone in dangerous circumstances can place the rescuer, the casualty and others in further danger. The first attendance should decide if it is safer to act or to contain the incident and wait for support.

There could be occasions when delay results in a saveable life being lost. Fire and rescue services should prepare their first-line managers to be able to make suitable and adequate dynamic risk assessments. This will enable them to make the right decision as the on-scene commander when choosing offensive or defensive tactics. Once that decision has been made, then all reasonably practicable steps should be taken to control the hazard. What is reasonably practicable will depend on the circumstances and demands of the incident and the available resources balanced against the identified hazards and evaluated risks.

The police have overall responsibility for missing persons. They will co-ordinate agencies to provide a suitable response to investigate and conduct search operations.

Control measure – Make appropriate decisions for rescue or recovery

Control measure knowledge

One of the most important decisions to be taken at water incidents is whether actions are being taken to rescue or recover casualties. A rescue can be carried out when people are obviously alive or are considered able to survive. A recovery is made when people are known to be deceased or not able to survive.

The distinction between rescue and recovery is important because it should influence the incident commander's decision making. They are likely to accept a higher level of risk to crews performing a rescue rather than a body recovery.

In some circumstances casualties can be seen in the water and may be able to work with rescuers. They can reduce the need for rescuers to enter the water by holding on to thrown lines or buoyancy aids. In other cases the casualty may be in shallow, still water in a known location and entry into the water may present minimal hazards. But once a casualty is submerged, particularly in deep water, the chance of rescuing and resuscitating the casualty will reduce over time and the hazards posed to rescuers will also increase if they are involved in rescue attempts. The simple desire to save life does not justify exposing operational personnel to unnecessary risk. A life should be assessed as being saveable balanced against the potential for serious injury or death to crew members carrying out rescue attempts.

Responders are not prohibited from taking reasonable action to save life before specialist resources arrive. However, suitable control measures should be considered before any action is taken. Hence a considered approach needs to be adopted regarding the immediate need for rescue, the potential for securing casualties and to provide time to implement appropriate control measures.

Whether a person is deemed missing or lost will also influence the response. The following categories apply:

Type	Description
Missing: event witnessed	This category is when a person or people are not seen to reach a point of safety. Typically this would be considered a high-risk event for the missing person (and potentially for any SAR asset). Examples include individuals who are seen being swept away by water flow or a car seen to be washed away when driving through water.
Missing: event not witnessed	This category is when a missing person or people should be found in a particular location, but for some reason they are not there or cannot be confirmed as being there. This may occur because of their own actions, or because of a failure in communications (e.g. telephone signal failure). Considerable effort may be needed to locate a missing person. This will normally be undertaken by the police.
Lost	These are people in a location of relative safety but not aware of their precise location or unable to provide it. Some effort is required to find out where they are before carrying out a rescue or evacuation.

There are four phases in every search and rescue scenario. Depending on the incident, they may be present to a greater or lesser degree. They are known by the acronym 'LAST':

Locate

Access

Stabilise

Transport

These phases are the basis of a set of principles that may be applied at every incident requiring search and rescue operations. The nature and complexity of the situation should determine the levels of management and control applied to the incident and the scale of the search and rescue operations. Refer to National Operational Guidance: [Performing rescues](#) for further information about each phase.

The model is designed to give casualties every reasonable chance of rescue and resuscitation and is balanced against the risk of harm to responders when carrying out rescues. The length of time submerged and the temperature of the water are the two main factors determining survivability. Generally, the longer a casualty is submerged and the warmer the water, the lower the chances of survival. Other factors affecting survivability include the age and/or size of the casualty, as smaller and/or younger people can survive longer than larger people or adults.

The model is based on the factors that affect survivability. The main factors are the length of time the casualty has been submerged and the water temperature. It is not possible to know for certain when a casualty became submerged, so the clock should start when the first attendance arrives on scene. It should not be assumed that the person has been submerged for longer than this.

The incident commander should carry out a risk assessment, balancing the likelihood of casualty survival and the likelihood and severity of harm to rescuers. The first attendance may not have specialist water rescue qualifications or equipment and this should be considered in the decision-making process. The decision will consider whether an immediate rescue can be started or if they should await specialist resources; incident commanders do not have to wait for specialist resources. Incident commanders will often be able to apply a safe system of work to take immediate action to perform a rescue. Each body of water should be considered individually because hazards will vary.

It is anticipated that after 30 minutes all three emergency services will probably be on scene. This may include specialist teams from the ambulance service and other rescue organisations, for example, HMCG, RNLI, police divers. The incident commander should liaise with officers from the other services to decide how to proceed. The first element to consider is the likelihood of survival. This clinical decision will be taken by the ambulance service based on the criteria above, or in their absence, by the incident commander. If the water is freezing cold the casualty should be considered survivable, although the likelihood of survival reduces as time passes. The risk assessment should be revisited to decide if rescue should continue or if the incident should switch to body recovery.

If a decision is taken to continue the rescue then, at 60 minutes, the incident commander should liaise again with the senior officers from the other services. If the water is cold and the casualty is known to be young and/or small they should be considered survivable, although again their chances are further reducing as time passes. The risk assessment should be revisited to decide if rescue should continue or if the incident should switch to body recovery.

After 90 minutes the incident commander should liaise again with the senior officers from the other services when the decision should be taken to switch to body recovery because the circumstances are regarded as no longer survivable.

Responsibility for body recovery rests with the police. Fire and rescue services will sometimes be involved if there is a need to act on behalf of the police. There is often time to wait for specialist water rescue teams to arrive at the scene. Incident commanders should not place non-specialist personnel at unnecessary danger to recover a body. When specialist teams arrive at the scene they should work with the police and the incident commander to decide if they should carry out the recovery. If the body is under water or if there are significant hazards a dive team should be requested by the police. The police may treat the incident as a crime scene so personnel should work closely with them to preserve evidence.

Water temperature in the UK averages about 10°C but can range from 0-25°C, depending on the location and the type of water. Fire and rescue services are not recommended to carry water temperature measuring

equipment to use at incidents because there are too many variables to expect an accurate reading. Instead, fire and rescue services should use water temperature charts for the particular area to find out the expected temperatures of the different bodies of water and at different times of year. Available medical evidence suggests that water temperatures in the region of 6-7°C or less are required for prolonged survival times in submerged casualties, sometimes described as 'icy cold'.

For further information see National Operational Guidance: [Incident command](#) - Decision Control Process

Strategic actions

Fire and rescue services should ensure that:

- All personnel (including service mobilising and control staff) are aware of the guidance for the rescue or recovery of persons from water and the survivability model
- Advice and information is made available to fire and rescue service responders regarding options and where possible response times for the attendance of multi-agency assistance
- Adequate debriefing arrangements are in place to advise future practice/procedures, training, assessment and maintenance of competence.

Tactical actions

Incident commanders should:

- Use the fire and rescue service recognised decision making model to assist in conducting an initial scene assessment
- Consider the need for immediate rescue or a means of securing the casualty
- Ascertain, search and/or rescue/recovery based on initial available information and scene assessment
- Ascertain rescue and/or recovery based on the information gathered using the survivability model
- Ascertain the number and condition of those in need of rescue or recovery; this will dictate the number and scale of required resources and priorities
- Refer to the Joint Emergency Services Interoperability Principles (JESIP)
- Use only those personnel with relevant and current skills, knowledge and understanding required for specific roles

Control measure – Water rescue and flooding training and maintenance of competence

Control measure knowledge

Suitable and sufficient arrangements for training and maintenance the competence of identified staff will need to be implemented if, as part of a fire and rescue service identified requirement, personnel will be required to respond to incidents involving the safety, search and rescue of people in water related incidents.

A fire and rescue service risk management and planning process should define the level of required response, skills, knowledge and understanding after taking into consideration the particular water related hazards within the authority's area. Arrangements must then be made to secure the provision of training for personnel as part of a programme of training and maintenance of competence.

As a minimum standard, all responding personnel should be trained to Level 1 – Water Awareness.

Strategic actions

Fire and rescue services should ensure that:

- All personnel who are nominated or reasonably expected to attend water related emergencies as part of an emergency response have acquired, apply and maintain the requisite skills, knowledge and understanding to operate safely, effectively and efficiently at water related incidents
- Opportunities to train, practise, familiarise and provide relevant feedback with anticipated multi-agency partners are made available

Tactical actions

Incident commanders should:

- Ensure personnel are trained and competent prior to deployment at operational incidents, according to the following roles:
 - Water safety awareness
 - Water safety and rescue first responder
 - Water safety and rescue technician
 - Water safety and rescue instructor/assessor
 - Water safety and rescue boat operator
 - Water safety and rescue incident management
 - Water safety and rescue incident tactical adviser
 - Fire and rescue maritime response

Control measure – Implement appropriate search techniques

Control measure knowledge

Searching can cover large areas with many potential hiding places and difficult or hazardous locations. Searches should be planned and organised to ensure the safety of personnel and maximise the chance of success. Police search advisors (PoISA) will take the lead in co-ordinating search operations.

Personnel should be suitably equipped and trained to operate in the appropriate zones. Searches may be conducted in adverse weather conditions or in darkness over an extended time period. Consideration should be given to rainfall and the likelihood of rising water levels, cold or hot weather exposure, visibility and uneven or slippery surfaces. Suitable PPE and equipment must be provided to mitigate risks.

Effective communications and knowing the location of search teams is vital. Teams should follow specific briefs and not self-deploy. Search teams should have a contingency plans in the event of communication breakdown. During search operations, continuous tracking of the exact locations of teams will be required. Using suitable maps will assist, and search team members will need to be competent in reading and reporting accurate map locations.

Establishing (and recording) the water entry point (WEP) as well as point last seen (PLS) and time will establish the starting point of a search. This is vital to limit the scale of a search in moving water. Once the WEP, PLS and time are known a judgement should be made on the average river flow and the time lapse to judge the maximum distance a casualty could have travelled. Resources should be sent to a point beyond this to secure a downstream containment.

An initial search is carried out by crews who can be deployed quickly along a designated search area to look for a survivable casualty. During the search they may identify areas where a casualty may be trapped or where a more detailed search is needed, including strainers, islands and natural egress points from a river. These probable locations need to be identified for a more detailed effective search. This information should be recorded and communicated to the incident commander and through them to the police search advisor (PoISA) so that more resources can be sent.

Specialist teams and capabilities may be required, such as:

- Swift water and flood rescue teams
- Volunteer search teams such as mountain or lowland rescue teams
- Police (including marine unit, air support unit, underwater search team)
- Search dogs
- Technical rope rescue teams
- Inland Waterways Rescue Association members
- Ambulance service (including ambulance helicopter and water rescue trained paramedics (HART))
- Maritime and Coastguard Agency, HM Coastguard rescue teams (land based and air sea rescue helicopters)
- RNLI and independent lifeboat organisations
- Other fire and rescue services with specialist capability, for example, Urban Search and Rescue, rope and/or water rescue
- Mountain or mines rescue
- Public technicians/specialists/operators operating in the hot zone area

Searches in the flood environment

There is an established hierarchy of search activities for wide area disasters, which is also applicable to floods. Initial reconnaissance is about developing intelligence to inform where to search, creating a common picture of the situation and directing mobile uninjured survivors to reception centres. No rescue activity would be conducted.

Hasty search

Quick search; identify location with easy-to-find casualties; very simple rescue or extrication. Call in resources to provide the rescue response.

Primary search

House to house type activities, typically using shout and listen techniques as well as quick visual sweeps to look for casualties; collection of intelligence such as number of people in building; survivor needs assessment; call in additional rescue support if required.

Secondary search – low coverage

Movement of debris in buildings; clearing street debris to find casualties; detailed search of debris in areas away from human habitation to find missing people.

Secondary search – high coverage

Full entry into all parts of building with removal of debris – no further search activity to be conducted on completion. Removal of all debris from areas with human habitation. Extensive search of other debris (move

from one location to another) to ensure a high coverage search. This would usually be conducted during the later stages of the response phase or as part of the recovery phase. The nature of these searches would usually be to locate flood casualties and evidence protection/recovery should be a key consideration to support the coroner and police.

Helicopter- based search

Helicopter assets may be an ideal method of searching larger segments, sectors or identifying and transferring search teams to hot spots or lily pads. Lily pads may also be used as a temporary area of relative safety for evacuees. The Aeronautical Rescue Co-ordination Centre (ARCC) based at RAF Kinloss will respond to all requests from the emergency services for helicopter assistance where lives are at risk. The potential contribution offered by air assets to a flooding event is considerable. The ARCC provides a common tasking procedure for all UK SAR helicopters. No costs are charged to the emergency service in situations where life is at risk. However, for other purposes costs may be charged.

Requests for assistance

Contact the duty officer at the ARCC with the following information:

- Location of incident (grid reference)
- Description of incident
- Nature of tasking; for example, rescue, reconnaissance, transport
- Number and position of casualties
- Hazards (overhead power lines, etc.)
- Weather / environmental conditions
- Other resources on scene

For further information see National Operational Guidance: [Performing rescues](#)

Strategic actions

Fire and rescue services should:

- Liaise with local authorities/local resilience forums to develop multi-agency arrangements for search procedures
- Provide tactical guidance and support to inform personnel of the potential hazards and actions
- Work with emergency services and multi-agency responders to co-ordinate search response
- Establish operational support arrangements, training content and practical exercises, co-ordination and co-operation (in accordance with JESIP principles) with identified partner agencies to enable effective interoperability at incidents

Tactical actions

Incident commanders should:

- Ascertain the specific area to be searched and ensure access and egress is maintained
- Ascertain weather forecast to assist tactical planning
- Liaise, communicate with and assist police search advisors (PoISA) who will lead and co-ordinate search operations and other agencies as part of a multi-agency response

- Use interoperability protocols and inter-agency assistance to develop an effective search plan (refer to control measure knowledge, organisations, specialist teams and capabilities)
- Appoint and brief search/rescue teams
- Appoint and brief safety officers and spotters

Rescuers should (attempt to) establish the following casualty details:

- Number and location (or last known location) of casualties
- Name, sex and age
- Clothing (for search identity and buoyancy assessment)
- Experience (swimmer, non-swimmer)
- State of mind (stressors, fatigue)
- Conscious/unconscious
- Floating/sub-surface/trapped

Control measure – Request police attendance

Control measure knowledge

Liaison with the police may be required for many reasons according to the circumstances surrounding the incident, available resources and safety critical considerations. Fire and rescue service interoperability planning in accordance with current national guidance will serve to enhance shared vision for the effective, efficient and safe resolution of water related incidents.

The police service has responsibility for recovering dead people from the water. Any incident where a body is discovered should be treated as a crime scene and disturbance should be kept to a minimum.

In some circumstances the police may not have the capability to recover bodies from water and may request assistance from fire and rescue services. Assistance may be required due to the location of the incident, the potential to cause distress to relatives or the public, and to secure the body from being lost in fast flowing waters. The fire and rescue service should provide assistance in close liaison with the police commander at the scene.

Crews may be faced with a number of onlookers and media interest. Wherever possible, police attendance should be requested to deal with crowds. Any media contact should be made through the police or in line with any local pre-arrangement.

Strategic actions

Fire and rescue services should:

- Liaise and consult with emergency responders regarding water related incident strategy
- Develop arrangements and protocols to highlight responsibilities and roles for effective inter-agency response
- Refer to the [Cabinet Office's 'Preparation and Planning for Emergencies: responsibilities of responder agencies and others'](#)

Tactical actions

Incident commanders should:

Exercise intraoperability and interoperability protocols – for further information see National Operational Guidance: [Incident command](#) and [Performing rescues](#) (Intraoperability).

- Request attendance/liaise with police to safely manage the following:
 - Co-ordination of search operations, carried out by police search advisors (PoISA)
 - Missing persons enquiries via the missing persons enquiry unit
 - Attempts at rescue by members of the public
 - Outer cordon controls
 - Traffic cordon controls
 - Criminal activity requiring further investigation
 - Removal of dead bodies following recovery
 - Requests for public information (press, media)
 - Police underwater search teams

Control measure – Establish control zones

Control measure knowledge

In simple water rescues from known, low hazard waterways and/or shallow, still water, it may not be necessary to establish control zones. They are also unlikely to be appropriate for wide area flooding or where localised flooding has taken place, where the activity will be more focused on protecting property, for example sites of special scientific interest, heritage sites or buildings. However, any decisions to not implement control zones must be regularly reviewed.

In some circumstances, such as fast moving water, poor visibility and/or unstable ground, control zones are used as an effective method of controlling resources and maintaining safety on the incident ground. Noise from flowing water or from surrounding sources can also be a significant distraction and should therefore be considered when implementing control zones. There are three zones used when responding to incidents: the hot zone, the warm zone and the cold zone.

The hot zone is the area covered by water. This is a high-hazard zone where rescues will be carried out and should only be entered by rescuers with the appropriate training and PPE.

The warm zone is the working area adjacent to the water. There is still significant risk here from uncontrolled entry into the water. The area is usually three metres across, but may be extended or reduced depending on the level of risk. In low risk situations, such as still, safe and known bodies of water, a warm zone may not be needed. Personnel working in the area should be suitably trained, equipped and briefed to carry out specific tasks.

The cold zone is the safe area located outside the hazard zones. Equipment dumps, rescue personnel and casualty reception/holding areas and marshalling areas should all be located in this area.

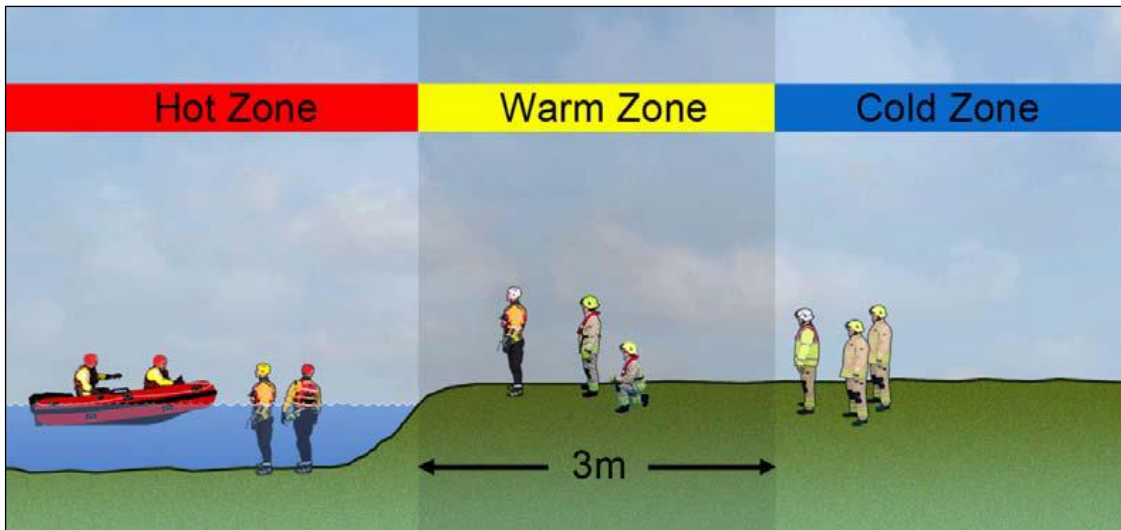
It is important that control zones are established, effectively implemented and communicated to all emergency responders as early as possible to maintain safe working areas and to assist in defining role responsibilities and objectives.

Depending on the levels of risk associated with numbers of personnel, amount of equipment and appliances, weather conditions, noise and geographical nature of the incident ground, personnel may be required to

monitor control zones. In such circumstances nominated personnel will need to receive a full brief regarding their role and the associated hazards.

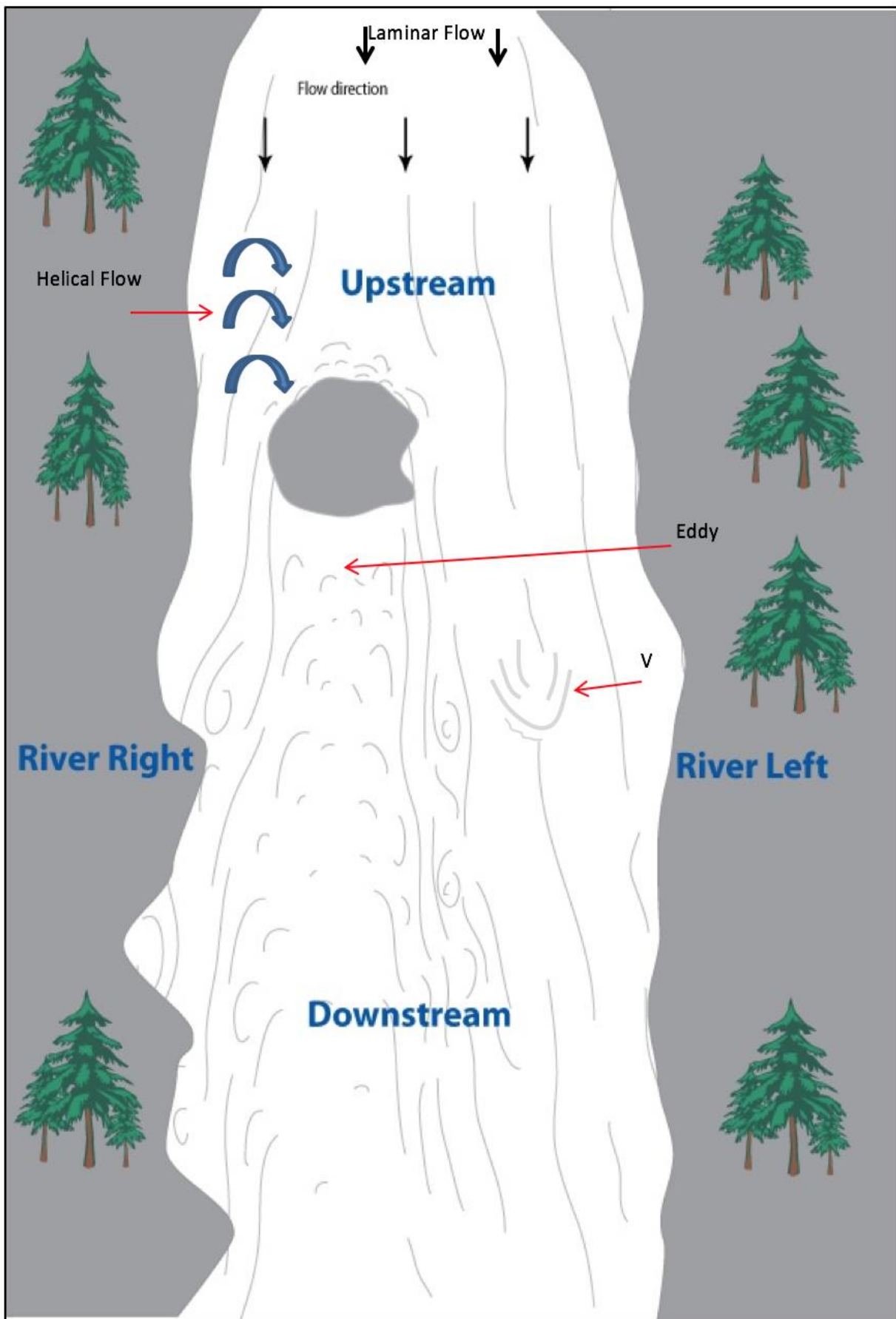
For further information see National Operational Guidance: [Operations](#) and [Incident command](#).

A forward control point (FCP) should be established on land as near to the scene of operations as reasonably practicable.



ARCHIVED

River right/river left, upstream and downstream terminology



Strategic actions

Fire and rescue services should:

- Collaborate with other emergency responders and multi-agency partners regarding the compatibility of control zones at operational incidents
- Refer to incident command protocols

Tactical actions

Incident commanders should:

- Designate and communicate specific areas for personnel including; multi-agency personnel, equipment, appliances and casualties
- Implement inner cordon controls to maintain a safe working area
- Establish and communicate hot, warm and cold zones to all emergency response personnel
- Consider noise within environments and implement appropriate control zones and additional control measures to limit the effect, for example: positioning of zones/personnel/appliances/equipment, use of loud hailer, recognised hand, light and whistle signals
- Consider the possibility of rising waters and increasing flow rates from tides and/or inundation/flooding

Control measure – Use appropriate techniques and equipment

Control measure knowledge

Personnel must take responsibility for their own actions and should work within the limits of their training (qualifications), experience, equipment and PPE. Teams should ensure they can protect each other with appropriate safe systems of work before attempting to rescue a casualty.

Refer to the [Defra 'Flood rescue concept of operations'](#) (Training Standards and Team Type).

The following should be taken into account:

- Gather all available information about the watercourse, including records from fire and rescue services and other agencies, and from witnesses at the scene
- Carry out a dynamic risk assessment to assess the potential for harm to personnel
- Consider the resources available and the rescue options
- Consider whether appropriate hazard control measures have been put in place before acting
- Be prepared to accept a reasonable level of risk that is appropriate to the circumstances
- Be prepared to accept that in some situations the risk is too great to take immediate action
- Always have a backup plan (Plan B/default) in case the initial actions are unsuccessful

All operational personnel responding should be trained to Level 1 – Water Awareness.

In addition to understanding the dangers of immersion in (cold) water, the risk assessment should consider the following when the casualty is submerged:

- Have personnel received specialised training and maintained competence in cold water search and rescue?

- Do they have adequate immersion protective clothing or equipment?
- Are there adequate supporting personnel and/or facilities?
- Is there the necessary support to carry out rescues at night or in water with poor visibility?
- Do the risks considered include potentially dangerous currents or submerged trap hazards?

Strategic actions

Fire and rescue services should:

- Identify, implement and provide support arrangements to enable relevant personnel to perform appropriate techniques and equipment in all reasonably foreseeable tasks
- Consult and liaise with sector competent agencies to define service strategy

Tactical actions

Incident commanders should:

- Assess the condition of the casualty in the water
- Use bends in a moving body of water to aid bankside rescue
- Use specifically designed and approved equipment to create a means of retrieving a person via a bankside in a moving body of water
- Use specifically designed and approved on-water equipment to gain access to people in water
- Use specifically designed and approved knives, whistles, mud-lances, personal location lighting, stretchers, animal cages and rope rescue kits
- Request and use appropriate specialist in-water rescue teams
- Use fire and rescue service provided and specifically designed water craft (including personnel trained in their use and operation) for retrieving a person from water
- Use other fire and rescue service provided and specifically designed appliances; for example, aerial appliances (including personnel trained in their use and operation) for retrieving a person from water
- Use specialist helicopter search and rescue organisations to perform/assist in the rescue operation
- Use specialist trained advisory staff to plan operational tactics effectively

Control measure – Maintain control of and provide support to the public including families of casualties

Control measure knowledge

Crews may be faced with onlookers and family members who may be distressed or attempting a reckless rescue. In such situations, communication regarding risks and actions currently being undertaken is essential to prevent people from entering the water. Police attendance should be requested to control the public and provide support to distressed people. Crew safety must be maintained even when faced with moral pressure to act.

Strategic actions

Fire and rescue services should:

- Liaise with co-responders to develop co-ordinated safe systems of work to ensure, as far as reasonably practicable, the safety of emergency crews and the public

Tactical actions

Incident commanders should:

- Provide timely advice to members of the public
- Implement and monitor cordon controls
- Liaise with attending police officers and police family support teams such as a family liaison officer
- Liaise with local authority social services
- Consider referring those bereaved to charitable organisations such as Cruse

Control measure – Avoid entry

Control measure knowledge

The associated hazards may dictate that the likely benefits of entering the water are outweighed by the risks. Therefore consideration should always be given to whether or not a rescue can be achieved by land-based techniques, if appropriate, or from a boat or platform, or whether alternative specialist rescue techniques will be required, for example helicopter rescue /assistance.

Strategic actions

Fire and rescue services should:

- Provide tactical support, options and actions to take for all foreseeable circumstances, with the co-operation of other emergency responders

Adopt principles contained in National Operational Guidance: [Operations](#) – Information gathering.

Tactical actions

Incident commanders should ensure the following approved hierarchical techniques are used as part of their initial tactical plan:

- Shout
- Reach
- Throw
- Row/Boat
- Go
- Helicopter and aerial operations

And in doing so should:

- Use trained and competent staff to perform specialist approved rescue techniques, negating the need to enter the water
- Request the attendance of specialist water rescue teams
- Use approved specialist volunteers, individuals or teams where fire and rescue service liaison or agreement has been previously organised

Control measure – Refer to Site-Specific Risk Information (SSRI)

Control measure knowledge

Each fire and rescue service must assess the risks to health and safety of their employees in their area and should produce site-specific risk information for locations where hazards and risks are significant. A site-specific assessment includes information relating to the pre-planning of operational activities.

Further information can be found in National Operational Guidance: [Operations](#)

Strategic actions

Fire and rescue services should:

- Assess the water-related hazards and features in their area
- Define what activities are likely to be undertaken in an emergency, particularly at locations where the public use any water for recreation.
- Ascertain Site-Specific Risk Information (SSRI), including:
 - The organisation responsible for managing the waterway
 - How they do so
 - How to contact them in an emergency
 - Agreements (if any) made for mutual assistance in an emergency.

Refer to National Operational Guidance: [Operations](#) for information on producing Site-Specific Risk Information (SSRI)

Tactical actions

Incident commanders should:

- Refer to SSRI to formulate tactical plans
- Use SSRI to train at regular intervals and, where agreements are in place, alongside other emergency responders/mutual assistance organisations. In particular, using launch and recovery points and bail-out options in local water courses during all weather and lighting conditions.
- Review and inform responsible SSRI managers of recommended changes to SSRI

Person in water

Hazard	Control measures
Person in water	Use competent personnel Wear personal protective equipment Use team identification system Nominate and position upstream spotters Nominate and position downstream safety teams Use trained first aiders, first aid/casualty care equipment (Performing Rescues – Casualty Care)

	Remove casualties from water using appropriate personnel, techniques and equipment Implement underwater search and recovery protocols
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Hazard knowledge

Hydrology

By its nature, a body of water is determined by the amount of water, the speed of the flow and the type of bed, banks and sides. Water can be considered as high energy or low energy. The force of water against an individual is directly related to the speed of the flow. Doubling the water speed will quadruple the force.

The flow of water in the middle of a river is generally the fastest and speeds decrease toward the edges. A casualty in moving water may be swept from the bank into the centre of the river. Water near the surface also moves more quickly than water near the river bed. When a river curves, water on the outside of the curve will travel faster than that on the inside.

Weirs are features designed to regulate the flow of water downstream and present specific hazards. They have fast-flowing water, dangerous currents, changing levels and possible undertows. A person or object in the water may be drawn towards the face of the weir and forced under the surface, to be flushed out further downstream. It is possible to be caught again by the tow back and recirculated in a similar manner. Due to the hazards posed, personnel should avoid entering these features unless a well-informed risk assessment identifies that it is safe to do so.

Where water passes over a vertical drop it accelerates and then recirculates downstream of the drop. This can cause a casualty or object to be held by the recirculating water. The strength of the recirculation may vary in different water levels.

Where water flows around an obstacle such as a boulder, the area behind the obstacle is usually calm water (eddy). This can be a good area for a swimmer to rest or to bring a casualty ashore. In fast flowing rivers with high water volumes the current in the eddy can be turbulent and difficult to exit.

Tidal conditions are predictable and can be anticipated and prepared for. Incidents which may involve tidal water have additional hazards from currents, tides and waves. Some rivers, inlets and estuaries are also influenced by the tides. The depth of water can change rapidly as the tide turns. Care should be taken to avoid being cut off or isolated from exit points. This may occur over a very short space of time at least twice a day, and will vary from day to day. If teams are made available for mutual aid deployments out of their area, they should be trained and equipped to operate in all foreseeable water environments. Inland teams should at least have a good practical appreciation of tidal waters, understand tidal features and be able to access and use tide timetables.

Flood water is moving water. The principles of operating in moving water apply even when the conditions appear to be still. In addition to tidal conditions, water levels can rise rapidly during periods of excessive inundation and flood. Examples include a sudden surge of water within a river environment (caused by moving water from one area to another to avoid flooding and reduce hazards in particular areas) to a rise in water level within a low lying body of water caused by run-off from the surrounding land.

The local micro-geography in a water environment can create radically different water movement characteristics over very short distances (less than 1m), and threat levels to responders will need to be constantly reviewed on scene by the teams themselves, with autonomy of decision making devolved to team leaders.

Electricity

When working in, on or near water, electrical hazards can have a significant effect on the immediate tactical options for incident commanders and if unidentified at the earliest opportunity, will pose significant hazards to personnel.

Sources of electrical hazard at specific water sites should be part of the identified hazards, risks and control measures which will form a fire and rescue service risk assessment.

Sources of electricity at water related incidents include:

- Electrical sub-stations (flood water)
- High-voltage overhead power lines (particularly in high winds or structural collapse)
- High-voltage underground power cables
- Poorly maintained electricity generators and heavy electrical plant in the immediate vicinity

In conducting a scene safety assessment, incident commanders and personnel should be aware of the electrical hazard potential and as such be vigilant in identifying and communicating possible sources.

Drowning

The World Health Organization defines drowning as “the process of experiencing respiratory impairment from submersion/immersion in liquid”. Drowning can result in death, injury, or no resulting injury.

There remains a significant hazard to rescued people who may have aspirated even a relatively small amount of water. Water can damage the inside surface of the lung, causing heart irregularities and reducing the ability to exchange air. Survival from drowning but involving unconsciousness or water inhalation can lead to serious secondary complications after the event, including death. This delayed collapse is referred to as secondary drowning, and is a regular cause of death in casualties who had apparently been successfully rescued.

Although it may not always appear obvious that the casualty requires immediate hospitalisation, it is recommended that all casualties that have aspirated any water should be treated with high concentration oxygen and transferred to hospital. This practice should be followed irrespective of how well they may claim to feel at the time. Advice should be sought from medical staff on scene.

A drowning person will panic in attempting to maintain their airway above water. This will increase the hazards to in/on-water rescuers and techniques will need to be employed to limit the potential and to use effective control measures.

Swimming following a large meal can result in vomiting and choking and this should be considered a possibility in risk assessment processes.

Movable or immovable objects

Still and flowing water-courses can pose unseen, critically hazardous elements. Rocks or other debris below the water surface or partially submerged may pose entrapment hazards to personnel and entangle rescue lines. This is particularly hazardous in flowing water where the force of water may also cause a loss of balance. Poor water clarity will make it difficult to identify sub-surface objects.

Hazards exist where fast-moving water flows against a solid object such as a bridge pillar. Most objects will tend to be flushed around the obstacle, but a person or boat could be pinned with considerable force.

A strainer is anything that allows water to pass through but traps objects and includes tree roots, fences, gates, and cars. A person or object may be drawn against the strainer and trapped by the force of water passing through it. Strainers present an extreme danger and should be avoided.

Entrapment can result from a number of situations involving movable or immovable objects in water.

Other areas where entrapment may occur include undercuts (on the outside of a bend where the current has worn it away) and where water is able to siphon under an object (such as a perched boulder or a vehicle). In flooded urban environments other entrapment hazards will exist such as displaced drain covers and street furniture.

Personnel working in the hot zone where powered boats are present and/or operating should be made aware of the potential for impact with boats and propellers. Effective control measures and communication strategies (with personnel and boat operators) will need to be devised and implemented to work safely.

Wading

Wading should only be used in relatively shallow water and slower currents using crews trained to operate in such environments. Consideration should be given to a casualty's condition if carrying out a wading rescue. What may be safe for a team of well-equipped and trained rescuers may not be appropriate for a casualty.

Floating and clean lines

Lines used in water should be highly visible floating lines. They should be used in such a way that they do not become a snag hazard where entanglement can occur, such as a knotted end that can float loose in the water.

Control measure – Use competent personnel

Control measure knowledge

The inherent hazards associated with water related incidents dictate that, personnel working near, in or on water and in hazard control zones should be suitably trained, equipped and briefed to effectively carry out all reasonably foreseeable tasks following a suitable risk assessment.

Strategic actions

Fire and rescue services should:

- Identify hazardous areas in relation to water and identify the numbers and locations of personnel who will acquire, apply and maintain pre-determined skills as part of a programme of development and maintenance of competence
- Consider Fire and Rescue Maritime Response arrangements where appropriate

Tactical actions

Incident commanders should:

- Ensure personnel are trained, qualified and competent to perform specific water related tasks and roles
- Monitor team performance and adjust or replace roles as necessary
- Consider requesting attendance from Fire and Rescue Maritime Response
- Provide feedback to organisations, teams and individual personnel

Control measure – Wear personal protective equipment

Control measure knowledge

As part of the fire and rescue service's risk management and planning process for bodies of water/water courses, and the potential eventualities in (and beyond as part of a National Resilience response), specifically designed personal protective equipment used for on, in and near water will need to be identified and included in training and maintenance of competence arrangements for nominated personnel. The Personal Protective Equipment at Work Regulations 1992 provides definitive legislative requirements for PPE.

For further information see National Operational Guidance: [Operations](#)

Strategic actions

Fire and rescue services should:

- Identify appropriate PPE required to perform all reasonably foreseeable tasks
- Ensure personnel are trained and competent in the use of PPE
- Make arrangements for the laundering/cleaning/decontamination and maintenance of PPE
- Ensure suitable arrangements are in place for the safe storage of PPE
- Ensure suitable arrangements are in place for the replacement of worn, damaged or expired PPE

Tactical actions

Incident commanders should:

- Request and wear suitable and sufficient specifically designed and approved PPE
- Use specifically designed and approved buoyancy aids, life-jackets and personal floatation devices for all personnel in the defined hazardous area
- Use specialist specifically designed and approved immersion suit equipment (heavy duty and/or limited use) for any activity requiring significant immersion of personnel
- Use specifically designed and approved equipment to protect personnel from the effects of cold water (thermal undersuit)
- Use specifically designed and approved footwear to be used by personnel entering water (if not attached to dry suits)
- Use specifically designed and approved hand protection (thermal insulated gloves) to be used by personnel entering the water
- Use specifically designed and approved safety headwear to be used by personnel entering the water

- Use specifically designed and approved harnesses to arrest movement of personnel in a hazardous area and/or to retrieve personnel from a hazardous area
- Make arrangements for replacing and/or decontaminating PPE before leaving the scene of operations

Applicable industry standards include the following:

EN ISO 12402-2:2006- Personal floatation devices -- Part 2: Lifejackets, performance level 275 -- Safety requirements

EN ISO 15027-1:2012- Immersion suits -- Part 1: Constant wear suits, requirements including safety

EN ISO 20347:2012- Personal protective equipment -- Occupational footwear

EN 420:2003- General requirements for gloves

PAS 028:2002- Marine safety helmets

BS EN 1497:2007- Personal fall protection equipment. Rescue harnesses

BS EN ISO 9554:2010- Fibre ropes. General specifications

Control measure – Use team identification system

Control measure knowledge

To determine capability and distinguish roles and responsibilities on the incident ground, it is important that, wherever possible, all teams and personnel from respective responding agencies are identifiable. The incident and attending personnel can be managed more effectively and efficiently if responders are easily identifiable using standard and agreed methods. This is of particular relevance during operations at night or poorly illuminated scenes of operation.

Strategic actions

Fire and rescue services should:

- Develop policy guidance and provide tactical support to enable standard methods for identification of specific roles in relation to water related incidents
- Consider, and where appropriate, liaise with other emergency responders and agencies regarding the identification methods used, particularly by local and neighbouring emergency services who may be requested to attend

Tactical actions

Incident commanders can use the following system of identification for water safety, search and rescue teams:

- Water safety (awareness): Standard fire kit, lifejacket and no fire helmet, or fire helmet worn with chinstrap unfastened
- Water safety and rescue (first responder): Yellow water rescue helmet
- Water safety and rescue(technician): Red water rescue helmet

- Rescue boat operator: Red water rescue helmet
- Team leader: White water rescue helmet

Incident commanders should consider the need for adequate means to identify personnel when performing work during night operations or in poorly illuminated areas.

Control measure – Nominate and position upstream spotters and downstream safety teams

Control measure knowledge

Upstream spotters

Flowing water presents many additional hazards to casualties, rescuers and other watercourse users. In a moving body of water unwanted, hazardous debris and materials such as glass, metal, large objects (rocks, vehicles, etc.) and harmful substances such as sewage and industrial chemicals (flooding) can be washed downstream and into the incident area where rescue operations are underway.

Debris may be on the surface, suspended in the water or rolling along the bottom. It could include trees or driftwood or it could be man-made. Additionally, rising water levels can be suddenly apparent in rivers during particular times of the year or during a period of inundation and flooding. Any upstream unwanted hazardous debris and materials along with rising water levels should be identified and communicated to rescuers at the earliest opportunity.

Additionally, other watercourse users in slow or fast boats, other fast moving water craft (such as jet skis), floating barges and swimmers or divers may be unaware of the emergency downstream and so may be a significant cause for concern. Moving craft can cause additional hydrological movement, making rescue more difficult as well as becoming an impact hazard to casualties and rescuers.

Early identification and communication with watercourse users can be an essential asset to an incident commander's planned and co-ordinated rescue. In any case, other water-course users should be warned or informed of the emergency events taking place downstream.

Downstream safety teams

Incidents involving moving water are inherently more dangerous for both casualties in need of rescue and for rescuers. Incident commanders will need to quickly assess the scene to decide if downstream safety teams will be required depending on the urgency of the rescue and the available resources.

Where possible and at the earliest opportunity, personnel should be positioned at a suitable downstream site to set up appropriate rescue systems for casualties in need of rescue upstream. Whenever rescue operations are in progress in flowing water, downstream safety teams should be positioned to provide additional safety for crews working in the hot zone. They will need to be equipped and trained to carry out a range of rescue options, which may need to include rescue swimmer capabilities. A priority will be to identify downstream bail-out points that rescuers can fall-back to if swept away.

Incident commanders will need to prioritise the effective use of personnel and equipment, particularly when waiting for additional resources to arrive. It may be necessary, for example, to implement either downstream safety teams or upstream spotters according to the outcomes of their dynamic risk assessment.

Strategic actions

Fire and rescue services should:

- Provide information to identify actions for specific bodies of water to inform personnel of the hazards and tactics
- Consider using multi-agency resources via local resilience forums or local government mutual understanding arrangements
- Ensure effective means of communication equipment and strategies are provided to ensure relevant safety information is relayed to relevant responders in sufficient time to take appropriate action
- Develop tactical guidance and support arrangements for the associated hazards and the actions to take to implement procedures for downstream safety teams

Tactical actions

Incident commanders should:

- Take into consideration the structures, buildings and obstacles on each side and the speed of the flowing water in deciding the distances teams need to be positioned upstream or downstream
- Nominate and brief staff, allocate appropriate PPE and communication equipment and position teams on either side of the water course
- Ensure an effective communication strategy is established between teams and the incident commander
- Check and maintain communications once teams are in position
- Consider the available time to set-up an upstream and/or downstream safety systems balanced against hazards and available resources. For example, is there a limited window of opportunity to save life? Refer to the [HSE's 'Striking the balance between operational and health and safety duties in the Fire and Rescue Service'](#)
- Designate an appropriate site for upstream and/or downstream safety operations (consider SSRI)
- Consider the hazards between the downstream safety site and the casualty
- Agree or decide on an appropriate or approved upstream/downstream safety system

Control measure – Use trained first aiders, first aid/casualty care equipment

Control measure knowledge

Casualties rescued from incidents involving water will require first aid and/or casualty care as a priority. In a best case scenario, the casualty will be suffering from the effects of shock. However, the range of injury and harm to casualties involving water related incidents can be wide and varied according to the nature of the hazards encountered.

For further information see National Operational Guidance: [Performing rescues](#)

Strategic actions

Fire and rescue services should:

- Liaise with emergency medical response partner agencies to co-ordinate response strategies and actions

- Consider using appropriate first aid equipment, including defibrillators and oxygen therapy equipment

Tactical actions

Incident commanders should:

- Nominate a trained and competent first aider or casualty/trauma carer
- Use approved first aid equipment
- Use approved equipment to protect the casualty from the effects of cold water shock and to reduce the possibility of hypothermia
- Use approved defibrillation equipment
- Use approved oxygen therapy equipment
- Hand over to definitive medical specialists

Control measure – Use of appropriate personnel, techniques and equipment

Control measure knowledge

Casualties in water will require lifting or moving in difficult situations. Personnel should adopt correct manual handling techniques and use team lifting, taking into account the need to use personnel who are trained and equipped to work in a zone. Casualties will be wet, slippery and difficult to grip or handle. Wherever possible use specifically designed equipment to assist in removing casualties from water. Casualties should be considered contaminated unless recovered from water that is known to be clean.

The capabilities of teams should be understood in the context of the approved rescue techniques trained for and adopted by the fire and rescue service. Teams should not operate in a way that they are not equipped or trained for. Bankside teams should not enter the water and wading teams should not attempt offensive swimming in fast moving water.

Underwater operations are not currently identified as a rescue activity in the UK. With the exception of casualties trapped in air pockets, underwater operations are conducted as a recovery task. The guidance set out in the Police Diving Approved Code of Practice should be applied. For further information regarding diving operations see the Diving at Work Regulations 1997.

There may be occasions when emergency personnel attend incidents where people are physically trapped (for example a foot trapped in a hole or drain) and water levels are rising. This may pose a significant risk of drowning to both the casualty and any untrained and unrestrained rescuer.

Physical contact with a struggling casualty should be avoided whenever possible. Personnel should offer buoyancy aids and lines to tow casualties to safety. If the casualty tries to grab the rescuer, the rescuer should push them away, splash water in their face, swim away and then try to calm them down. It is important to remember that a drowning person will be unable to speak or shout.

If physical contact has to be made, the casualty should be approached from behind. Rescuers should grab the casualty's clothing and push their knees into the casualty's back. They should signal to be pulled back to the side by raising one hand directly above the head.

Protection against cold shock and hypothermia is primarily provided through PPE and reduced exposure. Casualties should be encouraged to get out of the water whenever possible, even if it feels colder in air.

Casualties who have been in the water for a long time and are hypothermic or semi-conscious should be removed from water in a horizontal rather than vertical position if it does not unduly delay or complicate the rescue. This will avoid rapid drops in blood pressure. When in rescue craft casualties should be positioned to help blood flow back to the heart by placing them in a horizontal position with their legs elevated.

If casualties are alert and not hypothermic or their airways are under threat of being submerged, they should be removed from the water by the fastest, safe method available.

Gather all available information about the watercourse, including information and records from fire and rescue services and other agencies and from witnesses at the scene

Carry out a dynamic risk assessment to assess the potential for harm to personnel

Consider the resources available and the rescue options

Consider whether appropriate hazard control measures have been put in place before acting

Be prepared to accept a reasonable level of risk that is appropriate to the circumstances

Be prepared to accept that in some situations the risk is too great to take immediate action

Always have a backup plan (Plan B/default) in case the initial actions are unsuccessful

In addition to understanding the dangers of immersion in cold water, the risk assessment should consider the following when the casualty is submerged:

- Have personnel received specialised training and maintained competence in cold water search and rescue?
- Do they have adequate immersion protective clothing or equipment?
- Are there adequate supporting personnel and/or facilities?
- Is there the necessary support to carry out rescues at night or in water with poor visibility?
- Do the risks considered include potentially dangerous currents or submerged trap hazards?

Strategic actions

Fire and rescue services should:

- Develop tactical guidance and support arrangements to enable relevant personnel to perform appropriate techniques and use appropriate equipment in all reasonably foreseeable tasks
- Consult and liaise with sector competent agencies to define inter-agency strategy
- In consultation with other emergency responders and relevant agencies, ensure appropriate and approved techniques, personnel, teams and equipment are identified, included in service policy and communicated to all personnel and relevant others
- Ensure relevant personnel are trained and competent in the techniques and approved procedures for dealing with entrapped persons in rising water

Tactical actions

Incident commanders should:

- Use specifically designed and approved equipment to assist in the removal of casualties from water
- Use specifically designed and approved bankside rescue techniques and safety systems
- Use specifically designed and approved in-water (wading or swimming) techniques
- Use specifically designed and approved on water (boats, inflatable rescue paths) techniques
- Use specifically designed and approved over water (line access, aerial appliance) techniques
- Use specialist helicopter search and rescue organisations to perform or assist in the rescue operation
- Ensure a casualty reception area is established
- Consider using specialist rescue teams and equipment where necessary and where time allows
- Use specialist trained advisory staff to effectively plan operational tactics
- Where required, consider using hydraulic cutting/spreading equipment to create space
- Consider liaison with emergency medical staff regarding surgical intervention

Control measure – Implement underwater search and recovery protocols

Control measure knowledge

By the very nature of an emergency responder's role, attempts to save life will be a priority. However, many life threatening hazards are faced when attending incidents involving underwater rescue or recovery. Underwater rescue or recovery should be undertaken by specialist dive teams using approved equipment. Standard fire and rescue service breathing apparatus is not designed for underwater use. Whilst superficially similar to scuba gear, fire service breathing apparatus lacks a critical drain port in the first stage demand valve which is vital to underwater use of scuba. Although a fire service breathing apparatus set may work underwater for a short time, any seepage of water into the first stage can trigger an immediate hydraulic lock with no prior warning, leading to catastrophic failure of the air supply.

There may be specific sub-surface situations that can be controlled to allow a rescue attempt. These situations will usually be when the casualty is visible and submerged in shallow water, or when the rescuer is not required to go further than an arm's length into a vehicle. Vehicles in water are inherently unstable. They can roll and trap rescuers if mishandled.

Surface diving ('duck-diving') presents significant hazards such as entrapment and should be avoided. It should only be used in the simplest of rescues where appropriate control measures can be applied to safeguard the rescuer.

Underwater search and recovery in the UK is managed in accordance with the Police Diving Approved Code of Practice, as agreed by the HSE. Police-led diving operations are managed through a network of regional specialist units.

In this guidance a submerged casualty describes someone who would not be able to breathe because their airway is underwater. The circumstances dictating submersion can vary, for example, entrapment, weight of wet clothing and unconscious casualty face down. An immersed casualty is regarded as in the water and under normal circumstances, they would be able to maintain a clear airway. Examples of immersion include entrapment, person standing with their head above water and an unconscious casualty floating on their back.

Strategic actions

Fire and rescue services:

- May enter into locally arranged agreements for mutual assistance with specialist agencies to make provision for such circumstances involving the rescue or recovery of people under water
- Should develop and communicate protocols for actions to be taken, available resources and specialist agencies for sub-surface rescue and recovery

Tactical actions

Incident commanders should:

- Consider the use of trained and competent personnel to conduct wading searches
- Request specialist underwater search and recovery dive teams
- Ensure, as far as is reasonably practicable, evidence for police investigations is preserved and recorded. The survivability or preservation of evidence should be considered before indiscriminate attempts at recovery are made
- Consider the use of specialist camera equipment to help locate underwater casualties. Urban Search and Rescue teams use 'snake eye' cameras which are suited for such purposes
- Seek police-led diving operations and advice via local police search advisors (PoISA)

Slips, trips and falls (into water and/or from height)

Hazard	Control measures
Slips, trips and falls (into water and/or from height)	Minimise immersion hazards Identify hazardous areas Use of appropriate techniques and equipment Identify and implement emergency responders safe working zones

Hazard knowledge

Personnel should be trained to be aware of the increased danger of slips, trips and falls when working near water. These hazards will vary widely and will depend on the nature of the ground surrounding the water's edge, the depth of the water involved, the time of year and the physical condition of the individual. Standard operating procedures should include safe systems of work for working near water, working at height and preventing falls from height. Crews should be aware of the danger of an unplanned entry, how to control it, and the actions to take should an unplanned entry occur. Control zones should be used and the correct PPE should be worn. Hazards are greater at night, so adequate lighting should be provided and personnel should not work alone.

Control measure – Minimise immersion hazards

Control measure knowledge

An unplanned entry of an individual into a body of water can result in confusion, conflicting priorities for rescuers and additional stress placed on the incident commander and others in need of rescue. Safe systems of work must be implemented near, on and in water courses to ensure that any entry (rescuer or others) is part of a planned, controlled and safe process.

Personnel should be aware of the following four stages of immersion in cold water:

Stage	Timescale	Description
Initial immersion	0-2 minutes	The initial response is termed the 'cold shock', which results in an increase in heart rate and blood pressure. The shock can produce breathing and heart problems in some individuals. The responses include an uncontrollable 'gasp' and hyperventilation. It can lead to the aspiration of small volumes of water, which could be enough to drown. For the average male this volume is less than one large breath (1.5 litres of sea water or 3 litres of fresh water). Anyone suspected of having aspirated water should be taken to hospital even if they appear normal when rescued.
Short-term immersion	Less than 30 minutes	Being in water for a short period will cool the body. The limbs are particularly vulnerable, with cooling causes a rapid loss of muscle function. After spending 5-10 minutes in very cold water (5°C), or 10-20 minutes in warmer water (12°C), limb cooling can impair swimming performance. It can also impair actions essential to survival and rescue (e.g. tying lines or deploying rescue straps). Swim failure is a common feature in cold water and occurs in both strong and weak swimmers. No matter how strong and capable an individual may be in the water, cold water can very quickly become disabling. It is vital that individuals do not make decisions based on the belief that they can swim as well in cold water as in warm water.
Long term immersion	Over 30 minutes	Hypothermia does not normally occur in adults in less than 30 minutes of immersion. However it is important to be able to recognise the signs and symptoms. Casualties in rescue craft who are not wearing appropriate protective clothing in cold conditions, or who have been immersed for long periods will be more vulnerable. The signs of hypothermia include confusion, disorientation, reduced awareness, amnesia, irregular heartbeat, clouding of consciousness, loss of consciousness and a severely abnormal heartbeat.
At point of rescue		Following immersion in cold water, it should be remembered that the underlying problem is more likely to be near-drowning than hypothermia. Nearly 20 per cent of immersion deaths occur just before, during, or immediately following rescue. Many deaths are the consequence of the delayed effects of the aspiration of water when immersed. Other accounts suggest that some are caused by casualties 'relaxing' when rescue is imminent. To counter this, rescuers should encourage casualties to keep fighting for their survival and avoid statements like "relax, you are safe now". Another cited cause is the collapse of blood pressure when hypothermic

		casualties are removed from the water vertically and exposed to the effects of gravity. Semi-conscious or unconscious individuals should be well insulated to reduce heat loss, and should be allowed to re-warm slowly.
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Strategic actions

Fire and rescue services should:

- Ensure methods of minimising the potential for an unplanned entry into water form part of tactical support arrangements, training, maintenance of competence and site familiarisation programmes for those personnel with a responsibility for water related incident response

Tactical actions

Incident commanders and water safety or rescue team leaders should:

- Use appropriate PPE and initial immersion techniques in attempting to keep airways clear of the water, for example, personal floatation devices and dry suits
- Minimise the chance of consuming water (it is best not to try and swim until breathing is back under control, 1-2 minutes on average)
- Ensure rescuers enter water slowly to minimise the effects of cold-water shock
- Understand and communicate the fact that, repeated immersions in a short period can reduce the impact of cold water shock response
- Ensure additional control measures for working near water (edge working) including the use of ropes and harnesses to restrict individual working areas and prevent falling into water.
- Ensure personnel are aware of the safety signals for water rescue. For example, raising one hand directly above the head is a recognised method for a rescue swimmer to indicate they are in difficulty and/or need removing from the water. All personnel should understand this signal.

Control measure – Identify hazardous areas

Control measure knowledge

Where available, Site-Specific Risk Information (SSRI) should be consulted when attending water related incidents. It is important for incident commanders to carry out an initial scene safety assessment to identify all hazardous areas, particularly areas of poor light with the potential to cause difficulty, damage, injury and harm to emergency responders, members of the public, equipment and the environment. A scene assessment for hazardous areas should focus on the potential for physical and psychological injury, which may result if effective control measures are not implemented.

Strategic actions

Fire and rescue services should:

- Liaise with the local water authority and associated agencies, for example the environment agencies, to develop a mutual understanding and common operating picture

- Ensure that all hazardous areas and sites within their area containing water are assessed and information is produced to inform personnel

Tactical actions

Following completion of a scene safety assessment, action will be required to implement effective control measures to mitigate the potential hazards. Incident commanders should assess the potential impact of:

- Site access routes where personnel may be required to walk
- Steep river or water course banks
- Scene access routes such as undergrowth, overgrowth, potholes
- Areas where members of the public can congregate
- Fast flowing and/or turbulent water (potentially) causing undercuts to river banks
- Designated personnel and equipment areas
- Wet and/or slippery areas
- Weather conditions i.e. rain, snow, sleet, wind, strong sunlight
- Blind spots, for example, tunnels/underpasses, buildings or structures restricting line of sight

Incident commanders should also:

- Consider the use of specialist teams for site access, for example rope rescue teams
- Communicate with all emergency responders on arrival at the scene
- Ensure all emergency responders wear appropriate PPE
- Visually identify hazardous and no-go areas
- Visually identify access and egress routes
- Use scene lighting at night or in dimly illuminated areas
- Employ safety officers
- Consider using police officers to control members of the public

Control measure – use appropriate techniques and equipment

Control measure knowledge

Work restraint or fall arrest equipment may be used to prevent or limit the impact of a fall from height when working near, in or on water.

For further information see National Operational Guidance: [Performing rescues](#) (Use of working at height equipment).

The compatibility of equipment and procedures should be confirmed when designing dual-purpose work at height and water rescue systems. For example, work at height systems are normally designed so that they cannot be disconnected under load. A critical requirement of a water rescue system is that any rescuer entering the water is secured by a system that can be released one-handed by the wearer whilst under load. Lines used in water rescue should float.

The hazards to personnel working below any working at height activity should be considered, for example, bridges, steep embankments or falling material or objects.

Hypothermia can rapidly reduce the performance of poorly protected responders. Fit for purpose PPE will prevent hypothermia in rescuers but standard fire kit should not be relied on as it is not designed for use at water incidents.

Provision of relief responders and the use of local facilities for re-warming rescuers (such as a nearby fire station) will greatly reduce the potential for rescuers becoming casualties themselves. Flood incident managers should pay particular attention to the adequacy of welfare arrangements if they expect responders to continue to function effectively beyond the first few hours of an incident.

Hyperthermia is an induced hazard that can be caused when wearing impermeable PPE such as dry suits which lack breathable panels. Dry suits are invaluable PPE for water entry and should be worn when entering water more than knee deep. However responders should be alert to the hazards involved with the build-up of heat inside sealed dry suits when physically active on dry land and should dress down whenever safe to do so. Incident managers should make sure that PPE is correctly worn in the hazard zone. Buddy checks at an entry control point will minimise hazards to personnel, for example, tired responders forgetting to do zips back up on their dry suits.

Strategic actions

Fire and rescue services should ensure:

- Identify the relevant, approved industry standard techniques and in doing so the skills, knowledge, understanding and experience applicable to the particular circumstances of the incident type
- Appropriate equipment and PPE resources are provided to ensure the safety of personnel when carrying out their functional roles

Tactical actions

Incident commanders should:

- Ensure that appropriate PPE is worn by all emergency responders, dictated by identified control zones and hazardous areas
- Use industry standard approved techniques and equipment for all water related activities and interventions (see person in water, wear personal protective equipment)

Control measure – identify and implement emergency responders safe working zones

Control measure knowledge

Consideration should be given to other agency partners and emergency responders who may need to work in the hazard zones. These might include police officers, paramedics, ambulance service staff, environment agency personnel, vets, RSPCA inspectors and utility company personnel.

Responsibility for the safety of employees from other partners rests ultimately with their employers. However, fire and rescue services should anticipate that they will be expected to provide safety management expertise in the hazard zone.

Local resilience forums should prepare policy guidance and standard inter-agency operating procedures and establish protocols that clearly identify the responsibility and capability for safety management. The

guidance should set out who is expected to do what, and how mutual aid from outside the area will be managed.

The safe and effective outcome of an efficient system to control the activities of emergency response personnel, inter-agency partners and members of the public in a hazardous area is paramount. It will depend on the effective planning and implementation of a strategy in a short space of time and subsequent monitoring and reviewing of such a system.

Incident commanders will need to assess where personnel from all agencies can safely work, muster, access and egress. This will need to take into account the circumstances of the incident, weather conditions, personal protective equipment and the skills, knowledge, understanding and qualification of emergency responders.

A communication strategy will be required, to enable essential information (including PPE requirements, required skills, knowledge and qualifications, plan updates, for example, anticipated weather change, inter-agency liaison) to be circulated to all emergency responders on attendance and in identified working zones at timely intervals.

Strategic actions

Fire and rescue services should:

- Consult and liaise with relevant emergency responders on mutual understanding of safe working zones at water related incidents

Tactical actions

Incident commanders should:

- Plan safe working zones taking into consideration the hazards and the roles of all attending agencies
- Allocate appropriate water safety human resources to effectively implement the tactical plan
- Ensure that the safe working zone plan is fully implemented and resourced before use
- Check skill sets of emergency responders applicable to safe working zones
- Communicate and check standards of PPE of emergency responders
- Identify, locate, request and allocate appropriate specialist PPE, for example, personal floatation devices (PFDs), buoyancy aids and communication equipment
- Ensure emergency responders are supervised by an appointed, fully briefed and competent person or persons

Weather conditions

Hazard	Control measures
Weather conditions	Use effective planning and weather reporting systems Use shelter/protection from weather conditions

Hazard knowledge

Incidents often occur during poor or unfavourable weather conditions. Hot weather can also be hazardous to personnel working at the scene of an incident. Crew members can become very hot, very quickly and start to suffer effects of heat stress. The safety of firefighters working in all weather conditions should be taken into account.

High levels of rainfall and inundation can result in flash flooding and high water levels may lead to personnel being trapped or swept away. Objects such as trees and debris may be washed downstream, posing significant hazards to personnel. Strong winds can make it difficult to work and give rise to dangerous conditions in a wider incident area where there is a risk of structural damage and falling trees. Snow and ice may make entry and exit difficult and potentially dangerous.

Poor weather is also likely to severely impair visibility and potentially make communications more difficult. The use of some communication equipment may be limited or become impossible in poor weather conditions.

Control measure – Use effective planning and weather reporting systems

Control measure knowledge

Planning and responding to flood alerts and severe weather warnings is essential to ensure the appropriate resources are prepared before an event.

Weather forecasting in the UK is highly developed, reliable and readily available to emergency services. Forecast information should be used to plan in advance for anticipated severe weather. Alternative routes due to flooding or windblown trees blocking roads need to be considered along with the suitability of vehicles to operate in challenging conditions.

Strategic actions

Fire and rescue services should:

- Ensure that strategies are formulated to ascertain weather reports via accurate sources
- Cater for anticipated weather events according to management of risk and planning processes
- Provide tactical support and guidance for weather predictions
- Ensure that strategies are in place to enable timely communication of weather reports and anticipated weather events to operational personnel

Tactical actions

Incident commanders should ensure the appropriate agencies are contacted for weather condition reports, for example:

- Environment agencies issue flood warnings which are updated every 15 minutes
- The Meteorological Office issues severe weather warnings and provides the Hazard Manager service

Control measure – Use shelter and/or protection from weather conditions

Control measure knowledge

Fire and rescue services may be required to remain at the scene of an incident during unfavourable weather conditions for a prolonged period of time. In such cases, personnel will require shelter or protection from their potential effects. In addition, personnel will need to recognise and respond to the signs and symptoms associated with exposure of to the particular weather conditions and extremes of temperature. This applies to both personnel at the scene and any casualties.

Effects of excessive exposure to weather conditions include the following:

- Hypothermia. Occurs when the body's core temperature falls below 35°C. Cold water significantly accelerates the onset and progression of hypothermia
- Hyperthermia. Occurs when the body temperature is elevated and produces or absorbs more heat than it can dissipate
- Heat exhaustion. This is caused by dehydration and excessive loss of body fluids
- Heat stroke. This is caused by prolonged exposure to excessive heat and/or humidity
- Sunburn. Excessive exposure to direct and filtered sunlight

Strategic actions

Fire and rescue services should:

- Provide tactical and logistical support and guidance for rotating or replacing personnel at the scene and at pre-defined periods of time to enable them to return to their main place of work
- Ensure personnel are made aware of the effects of excessive exposure to unfavourable weather conditions
- Make provision for the use of temporary structures to protect personnel from the effects of the weather
- Make local arrangements with premises occupiers or owners for temporary occupation by fire and rescue service personnel
- Make provision for the use of sun protection, head-gear and/or sunblock

Tactical actions

Incident commanders should:

- Ensure personnel wear appropriate PPE to protect them from the effects of weather conditions when working in, on, or near water
- Ensure personnel are given opportunities to cool down and rehydrate. For example, remove PPE when conditions are hot and provide drinking water at the scene
- Where necessary, ensure personnel are protected from hot sunlight. For example use a designated shaded area
- Rotate or replace crews to protect them from the effects of cold or hot weather

Unstable or unsafe surfaces and areas

Hazard	Control measures
Unstable or unsafe surfaces and areas	Implement safe methods of working Establish safe methods of access/egress

Hazard knowledge

A fire and rescue service may be required to attend and respond to emergency water related incidents that involve a variety of hazards, including unstable ice, mud, slurry, sand and bankside areas to bodies of water. Incidents may involve tidal areas which will entail additional hazards including surrounding structures which may require immediate consideration by incident commanders. Casualties in the water may suddenly move and become trapped in a confined space such as an undercut or a culvert which will place both the rescuer and casualty at greater risk.

Unstable surfaces can be potentially treacherous to any rescue team. An unstable or soft surface will give way when downward pressure or weight is applied. The surface may be so soft that people or animals can sink until movement becomes impossible. Alternatively a layer of relatively firm ground may break through into softer ground below and banksides to bodies of water can give way suddenly, especially when fast flowing water may undercut river banks.

Ice

Ice should never be considered safe to walk on. A thickness of 100mm of ice across an entire surface is required to support the weight of an average person, but this is impossible to measure to ascertain a safe working area. Ice, therefore, should never be considered safe to walk on. Ice may also have flowing water underneath, which is extremely dangerous as entrapment can result. Personnel can fall through ice and travel a significant distance below it.

Mud, slurry and sand

It may be difficult to access casualties through deep mud, slurry, or sand, particularly in tidal areas, and can become impossible without specialist equipment such as mud shoes. The distance to the casualty can also make the situation more difficult. Incidents can be particularly hazardous at night or during periods of poor visibility such as dense coastal fog.

Casualties may also move and become trapped in a confined space, which will place both the rescuer and casualty at greater risk.

HM Coastguard can provide details of specialist mud rescue services in coastal areas. Coastguard rescue teams and some local voluntary rescue associations may have considerable knowledge of the area and the capability to operate on local mud flats. Where they exist, other emergency services should make use of this knowledge and skills to ensure co-ordinated responses to any emergency.

Off-road vehicle and towing capabilities can be a great asset in transporting personnel and equipment over otherwise unsafe ground and enable them to reach remote sites. Some vehicles have equipment to support wading capabilities which can be beneficial in some areas.

Control measure – Implement safe methods of working

Control measure knowledge

It is essential that fire and rescue services anticipate potential events involving water related emergencies and that they identify and develop the required skills, knowledge and understanding of nominated personnel to be equipped and able to safely, effectively and efficiently deal with such incidents. All personnel at the scene of an incident are required to co-operate and work safely to ensure safe working systems are maintained.

The following standard list of hand signals will assist the communication process for emergency responders when working near, on or in water:

Hand Signal	Meaning
One hand flat on head	OK
One arm raised above head	Distress
Pointing with one arm outstretched above horizontal. May be preceded by circling hand vertically in air	Move in that direction
Pointing with one arm outstretched below horizontal	Attention to or hazard in water
Both arms crossed in front of chest	Need medical help or bring medical kit
One arm outstretched in front of chest showing palm	Stop
When in boat – arm outstretched to one side	Move in that direction
When in boat – both arms raised above head	Stop
When in boat – one arm outstretched at side of body bent upwards at 90°	Holding position

Strategic actions

Fire and rescue services should:

- Identify the areas within their area where specific safe methods of working in, on or near water related sites will be required
- Liaise with other emergency services and agencies to ensure mutual understanding and agreement on safe working procedures
- Ensure pre-determined tactics, training, information updates, attendances and site responsible person liaison are built into tactical plans and Site-Specific Risk Information (SSRI) and communicated to operational personnel at the scene of an incident

Tactical actions

Incident commanders should:

- Ensure walking on unstable surfaces is avoided wherever possible
- Assess the surrounding area to check for any confined space hazards, which may need to be considered and implement appropriate control measures, for example, surrounding hazards such as undercuts, holes, pits, tunnels, culverts and low bridges

- Ensure that consideration is given to the possibility of bankside erosion (undercutting) from flowing water
- Use trained personnel to operate inflatable rescue paths and other types of rescue platforms which may provide a stable platform to work from
- Use specifically designed and approved rescue craft when operating on mud or in tidal areas
- Consider the use of specialist equipment, for example, mud lances, shovels, hoses, cylinders and casualty survival bags. Paddles, reach poles and similar devices may be used to work through ice
- Ensure suitable methods of transporting equipment such as backpacks are provided to allow hands-free operation
- Ensure suitable methods for removing unconscious or immobile casualties are provided
- Ensure suitable lighting is provided when working at night or in poor visibility. Teams should be identifiable and locatable using either chemical light sticks or battery operated equivalents. Consider the use of helmet mounted torches to provide hands-free capability, particularly for responders who enter the water
- Consider appropriate methods to limit the effects of contamination from mud and other sub-surface contaminants. For further information refer to Waterborne Contaminants
- When digging close to casualties, ensure considerable care is taken. The casualty may be numbed by the temperature of the mud and may not feel any contact with the spade or tool being used. Serious injury to the casualty caused by digging may not be immediately obvious
- In all but the most minor cases, ensure casualties are not allowed to walk out of the hazardous area. Advice can be provided by ambulance personnel. Sudden release and attempts to stand may induce post rescue collapse with possible fatal results. The casualty should be evacuated in as near a horizontal position as possible and passed to ambulance personnel for treatment.

Control measure – Establish safe methods of access and egress

Control measure knowledge

When considering the term unstable surface in this document, it should include substances such as ice, sand, mud, slurry and banksides to bodies of water. Other unstable ground environments will be included in other national operational guidance documents.

All expanses of water within the area of fire and rescue services should be considered possible sites for incidents involving unstable ground.

Strategic actions

Fire and rescue services should:

- As part of their risk management and planning processes, conduct assessment of, visits to and where required training involving the water related sites in their area.
- Make all relevant information available to operational personnel at the scene of an incident

Consideration should be given to the following:

- All possible access and egress routes and safe working areas, including any designated water entry and evacuation points, rendezvous points, marshalling areas and personnel and equipment areas
- Seasonal variations and possibilities of ice formation, inundation, visual impairment and mass public attraction

- Fire and rescue service vehicle access, including any weight, height or width restrictions and the need for all-terrain vehicle resources
- Other access and egress users and the possibility of blockage in an emergency, for example, people, vehicles, temporary structures and flood water
- The potential for erosion of any bankside from flowing water
- Site responsible persons plans and risk assessments
- Overhead hazards such as power lines, bridges and other services or structures
- Requirement for pre-determined attendance and specialist assistance and/or equipment, for example. specialist rescue teams and appliances

Tactical actions

Incident commanders should:

- Identify safe access and egress routes and areas for the site and any specific working areas
- Consider the potential for any compromise of access and egress routes
- Clearly communicate and indicate designated access and egress areas to all personnel
- Ensure all personnel are briefed on access and egress to the site and work areas
- Ensure adequate lighting is providing where required
- Use specifically designed and approved inflatable rescue paths
- Use specifically designed and approved equipment and procedures to gain access via steep and/or slippery slopes and overgrown vegetation, for example, fall arrest equipment, aerial appliances and helicopter support
- Use specialist advisors, teams and equipment to allow safe access and egress

Waterborne contaminants

Hazard	Control measures
Waterborne contaminants	Develop knowledge of contamination sources Use good hygiene practices Limit exposure using correct operational procedures Decontaminate people, PPE and equipment Develop knowledge of medical signs and symptoms Develop inoculation programme and occupational health monitoring

Hazard knowledge

Responders may come into contact with contaminated water during either planned or unplanned events. There is a clear link between water infected with microbial hazards and ill-health in humans.

During emergency activities, services will not normally be able to assess the level of water quality. Fire and rescue services should use appropriate control measures including pre-planning knowledge, correct tactics, PPE and levels of decontamination. Responders may also be exposed during non-emergency activities where water quality can be determined in advance.

Emergency responders should be aware that the hazards involved with contaminated water related incidents will increase during periods of inundation.

Control measure – Develop knowledge of contamination sources

Control measure knowledge

At incidents it may not be possible to eliminate exposure to contaminated water. Crews should be aware of the hazard, sources of contamination, how to minimise their exposure and the decontamination procedures.

Additional sources of monitoring are available. Environment agencies may provide assistance to the fire and rescue service regarding risk assessment of particular bodies of water.

Some infectious diseases are reportable under the Public Health (Control of Disease) Act 1984 and the Health Protection (Notification) Regulations 2010. The following links are a source of relevant information.

<https://www.gov.uk/health-protection/infectious-diseases>

<https://www.gov.uk/government/collections/notifications-of-infectious-diseases-noids>

Strategic actions

Fire and rescue services should:

- Consider the environmental information regulations to access relevant data
- Consult and liaise with the environment agencies on bodies of water and known contaminants within their area
- Provide tactical support and guidance to assist operational personnel in identifying contaminants at the scene of an incident
- Identify, record and communicate potential and known contaminant hazards for bodies of water in their area
- Provide appropriate PPE for the task being performed to reduce exposure to the water and the potential for contamination

Tactical actions

Incident commanders should:

- Identify and communicate potential and known sources of contamination for a body of water
- Consider obtaining assistance and/or advice from the environment agencies to develop risk assessments
- Record contaminant information, human effects, effective control measures and decontamination methods in a Site- Specific Risk Information document (SSRI)
- Communicate information to all personnel who may have come into contact with contaminants
- Use specialist resources for individual high-risk sites where agreed and required

Control measure – Implement good hygiene practices

Control measure knowledge

There is a possibility of contact with contaminants at all water related incidents. There should be strict control of personal hygiene. After contact with water, personnel should avoid eating, drinking and smoking before decontamination.

Note that there are two broad categories of water: Water for human consumption and environmental water quality. This guidance only refers to environmental water quality.

Strategic actions

Fire and rescue services should:

- Provide tactical support, information and guidance for hygiene and control of hazardous substances at water related incidents
- Provide means and equipment for the specific decontamination of known hazards associated with water sites where there is reasonable expectation crews may be required to work
- Ensure that suitable safe systems of work are in place for removing contaminated clothing from the incident ground and also consider the provision of additional clothing and PPE at the scene
- Provide for post-incident health monitoring in conjunction with occupational health professionals

Tactical actions

Incident commanders should, for all personnel:

- Ensure appropriate hand protection is always worn when working in, on or near water
- Ensure broken skin or cuts are adequately covered with waterproof plasters
- Ensure washing takes place after contact with unclean or open water, handling animals, contaminated clothing and/or equipment
- Ensure washing always takes place before eating, drinking or smoking
- Ensure avoidance of contact with stagnant or slow moving watercourses
- Ensure clothing and equipment is decontaminated using the approved method following immersion in open water
- Ensure, correct and serviceable footwear is worn when working in, on or near open water
- In some circumstances, advise personnel of the need to shower on return to station

Control measure – limit exposure using correct operational procedures

Control measure knowledge

Potential for contamination contained in a body of water can be high, whether working in, on or near the water. The key principle of limiting and controlling exposure to any waterborne contaminant is effective planning. Therefore, safe working systems designed to limit exposure of personnel to waterborne contaminants, should be based on current and reliable Site-Specific Risk Information (SSRI).

Strategic actions

Following service risk management and planning processes, fire and rescue services should:

- Provide tactical support and guidance on the hazards and actions to limit exposure
- Ensure operational personnel are made aware of the safe operational procedures to limit exposure and to make informed decisions on the tactics to be adopted at water related incidents
- Ensure operational personnel receive suitable and sufficient information on the arrangements for occupational health advice and support, particularly following potential contamination via a body of water

Tactical actions

Tactics range from bankside operations involving handling wet and potentially contaminated equipment and people to full body immersion of water rescue technicians.

Incident commanders can limit exposure to contaminated water by:

- Performing bank-based rescues using appropriate equipment
- Minimising the number of personnel exposed or in the hazard zone
- Using boats or platforms
- Using trained staff to adopt appropriate wading techniques
- Using appropriate RPE where required

Control measure – Decontamination of people, PPE and equipment

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

Control measure – Develop knowledge of medical signs and symptoms

Control measure knowledge

Fire and rescue service personnel should have knowledge of medical signs and symptoms related to potential waterborne diseases. These can include Weil's disease and other zoonotic bacterial disease, blue green algae, gastrointestinal infections, Hepatitis A, and manufactured pollutants from agriculture and industry.

Information on the symptoms of typical waterborne infections can be found here:

<https://www.gov.uk/health-protection/infectious-diseases>

The effects of a contaminant may not be immediately apparent and symptoms could take considerable time to appear.

Strategic actions

Fire and rescue services should:

- Ascertain information on site-specific contaminants, their effects and symptoms
- Ensure systems are in place to enable personnel to recognise the signs, symptoms, effects and the actions to be taken in the event of becoming infected or contaminated. Responders should seek medical advice in the event of illness following possible exposure to specific contaminants such as Weil's disease

- Establish an appropriately located decontamination point
- Ensure means of reporting and recording such events and a means for providing support via occupational and/or specialist health services are available

Tactical actions

Incident commanders should:

- Use occupational health monitoring facilities and record exposure of personnel to contaminants using service exposure recording procedures
- Be aware of and watch for signs and symptoms of the effects of contamination appearing in personnel following attendance at incidents
- Provide advice and support using service occupational health services referral where necessary

Control measure – Develop immunisation programme and occupational health monitoring

Control measure knowledge

Fire and rescue service personnel may come into contact with substances that are hazardous to their health. The nature of their role requires personnel to be aware of the potential when attending water-related incidents,

Strategic actions

Fire and rescue services should:

- Consider the type of activities personnel will be engaged in and the potential for contracting waterborne disease
- Ensure firefighters are immunised against relevant waterborne diseases where appropriate
- Seek information and advice on common waterborne illnesses such as leptospirosis (one form of which is known as Weil's disease), cyanobacterial disease (blue-green algae), hepatitis A and gastro-intestinal infection
- Ensure procedures are in place for personnel to report health issues following exposure to the water environment. This should include on-going health monitoring.

Tactical actions

Incident commanders should:

- Use service agreed immunisation programmes for personnel susceptible to contact according to fire and rescue service risk management and planning processes
- Ensure health monitoring systems cater for measures to check, record and inform of waterborne contamination of personnel

Flood water

Hazard	Control measures
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Flood water	<p>Plan for resilience and identification of hazards</p> <p>Refer to Defra concept of operations</p> <p>Develop rescue planning strategies</p> <p>Define the area of operations</p> <p>Use search and rescue cell search planning considerations</p> <p>Use safe working practices to deal with pets and animals</p> <p>Manage emergent volunteers</p> <p>Consult and liaise with the Fire and Rescue Service National Co-ordination Centre (FRSNCC)</p> <p>Use accreditation of flood rescue agencies</p>
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Hazard knowledge

A flood is water outside the bounds of normal watercourses. The source of flooding may be the sea, overflowing rivers, surface water flash flooding or groundwater.

Floods and flood waters present significant hazards. They are often predictable and fire and rescue services should rely on weather and tide forecasting when planning their incident response.

There are four realities of floods. They are:

- Multi-agency events
- Multi-jurisdictional events
- Hazmat and public health events
- Long term events that can exhaust emergency personnel and community members emotionally, mentally and physically

Flood water can be moving water. The principles of operating in moving water apply even when the conditions appear to be still. In a flood, a river overtops its banks and begins to flow through the surrounding land (the flood plain), or the low areas adjacent to the river. In this process the flood water becomes less predictable and more dangerous. Flood water is also a hazardous substance.

Under flood conditions the following will typically apply:

- The size and power of the river is greatly increased
- Structural features, such as weirs, sluices and culverts, become more hazardous
- Bridges may not have enough clearance for boats to go under and may become structurally unsound
- Eddies are wide and can be laced with rapidly moving whirlpools with powerful undertows that may be difficult to escape from
- Flood waters contain debris which can clog intakes and foul rescue boat propellers
- Trees and other large and heavy objects may join the river flow. They will often collect against bridges to form strainers or natural dams
- Water flows through features on the flood plain like trees, hedges, fences and debris may form strainers

- In more urban areas like streets, neighbourhoods and towns the danger of contamination from pesticides, faecal matter, deceased livestock and chemicals greatly increases
- Water treatment plants may flood and cease functioning altogether

Fire and rescue services may consider using SEADEPTH, the Charlotte Fire Department, USA model for flood disaster responses as a tool for assessing hazards and sizing up incidents.

S: Situation and Strategy. Should the agency be put on alert, should reconnaissance be conducted, or should we be responding?

E: Egress. If my team goes in to make the rescue, can we get them out? Are we losing egress because the water is rising?

A: Access. Can I still get to the site where the car is trapped, or am I losing it? If we lose access, we lose egress. So being pre-deployed and having evacuation routes already established are essential.

D: Development. How developed is the area we are going to? What is the population, how many structures, and how will that affect run-off and hazardous materials?

E: Existing rainfall

P: Potential rainfall. Increasing flooding and water depth.

T: Topography. Survey maps of the area are a critical part of the cache for incident command, along with insurance and flood plan maps. Using these tools, incident command should be able to determine where the water will go and what areas are going to be inundated first.

H: Hazards. Have all the existing and potential hazards been identified? Has the IC identified a "technical specialist" to assist? Are there storm water management systems that haven't been taken into account as potential hazards? Remember, floods are public health danger events

Flood response tactical advisers also use the SMEAC template as a planning aide for managing flood incidents:

S: Situation

M: Mission

E: Execution

A: Administration

C: Command

Wide area flooding

A wide area flood is one that crosses local resilience forum boundaries. Multi-agency planning may be needed to deploy limited resources in response to competing requests for assistance

Wide area flooding is predictable. There will be around five days' notice of weather and three days of flood forecasts. The detail in the forecast will increase in the 36 hours before the event. Planning should focus on evacuation from the hazardous area before the flood rather than rescue after the event

Rescue and recovery planning should be based on the assumption that once the water has breached the defences, it is likely that roads and bridges will be damaged, islands will be formed and land access routes for rescuers may not be available

Damage or failure may occur across utility and transport infrastructure. Affected essential services may be inoperable for up to 14 days. Some critical Infrastructure may be compromised.

Further information is available from the [Defra 'Flood rescue concept of operations'](#).

Control measure – Plan for resilience and identification of hazards

Control measure knowledge

Given the highly developed status of weather and flood forecasting in the UK, no flood event, from whichever source, should ever be a surprise. Flooding is predictable at the strategic resourcing level and at the tactical level for a specific forecast event. Such incidents should be managed as an intelligence-led, planned event.

Floods are moving incidents that follow physical rather than administrative boundaries such as areas represented by local resilience forums. They are often long duration, multi-agency events, with knock-on impacts that will degrade and challenge service providers across a wide spectrum, including power, communications, transport, logistics and public health.

Effective management of flood incidents requires joint planning and preparation recognising these principles.

The following legislation and guidance is applicable to flood incidents and relevant to emergency planners and responders:

Flood Risk Management Act (Scotland)

<http://www.scotland.gov.uk/topics/environment/water/flooding/FRMACT>

National Strategy for Flood and Coastal Erosion Risk Management in Wales

<http://gov.wales/docs/desh/publications/111114floodingstrategyen.pdf>

Flood and Water Management Act 2010 (England and Wales)

<http://www.legislation.gov.uk/ukpga/2010/29/contents>

[National Planning Policy Framework](#)

[Technical Guidance to the National Planning Policy Framework](#)

[The Pitt flooding review](#)

[National strategies Future Water](#)

[Localism Act](#)

[The Building regulations 2010](#)

[EU Floods Directive and the Flood Risk Regulations](#)

[Water Framework Directive](#)

Strategic actions

Fire and rescue services should:

- Identify areas vulnerable to flood and develop risk management plans and processes
- Liaise with local authorities and local resilience forums to develop contingency plans and to update the community risk register
- Consult and liaise with site owners and/or controllers (particularly for specific risks including EPR and COMAH sites) to develop tactical guidance and support arrangements to inform personnel of the hazards and actions
- Work with emergency services and other agencies to co-ordinate response arrangements.

Tactical actions

Incident commander should:

- Acquire knowledge of areas vulnerable to flood hazards and communicate this to personnel
- Assist in the process of planning and identification of hazards by conducting visits to specific sites and gathering information to inform risk management plans and processes
- Acquire and understand tactical guidance and support arrangements and communicate this to personnel

Control measure – Refer to Defra ‘Flood rescue concept of operations’

Control measure knowledge

A national mutual aid scheme has been developed by Defra to provide a framework for co-ordinating a rescue response to major flood events. This includes a concept of operations that provides a model for flood incident management that can be applied to all flood events from local deluge through to catastrophic wide area inundation.

For rescue activity, the co-ordination of flood response will be managed under the National Co-ordination and Advisory Framework (NCAF), the established formal governance structure for managing National Resilience assets such as urban search and rescue and mass decontamination. Flood response sits alongside these capabilities and mobilisation of flood resources will be in line with existing arrangements for those functions.

Team-typing

The Defra ‘Flood rescue concept of operations’ sets out a national team-typing system. This describes standard packages of resource (people and equipment) according to their capabilities and the outcome they can safely achieve.

Strategic actions

Fire and rescue services should:

- Adopt and use the Defra ‘Flood rescue concept of operations’ <https://www.gov.uk/government/.../flood-rescue-concept-of-operations> to guide planning, resilience and risk management plans/processes

Tactical actions

Incident commanders should:

- Use the Defra 'Flood rescue concept of operations' <https://www.gov.uk/government/.../flood-rescue-concept-of-operations>. For example, the frameworks, standards, equipment and generic operational processes required to manage and effect rescues from flood water

Control measure – Develop rescue planning strategies

Control measure knowledge

Strategic planners need to decide in advance what they will do when they receive a flood warning from the Flood Forecasting Centre. They should be aware of which level of warning will trigger action by their organisation and pre-emptive deployment should be considered at the earliest opportunity. They should consider the time needed to mobilise and deploy teams into the affected area before roads and bridges are rendered impassable or washed away.

The distinction between rescue and evacuation should be established, for example:

- Rescue is pulling a floating casualty from moving water or airlifting someone hanging from a tree over a torrent
- Evacuation is transferring people from a temporary refuge where they may be wet, cold and uncomfortable but are not at immediate risk of death or injury, to a place of safety from which they can be relocated

The tasks given to specialist assets should reflect and respect this distinction, and the highly restricted number of assets able to undertake rescues in the worst environments should not be frittered away on evacuation duties if other responders could do the job instead.

Major flood events will require deployment of a range of national resilience assets in addition to flood rescue teams and the response will therefore be managed in a co-ordinated manner via nationally arranged protocols.

For further information see [Emergency Response and Recovery](#)

Strategic actions

Fire and rescue services should:

- Develop suitable and sufficient local planning and response arrangements in conjunction with local resilience forums
- Ascertain the voluntary agencies and arrangements that can play a significant role to enhance response work
- Ascertain and comply with national arrangements for mobilising local resources and national assets

Tactical actions

Incident commanders should:

- Be aware of the local and national planning and response arrangements

- Assist in developing tactical planning and response arrangements
- Ensure resources are available or pre-arranged to cater for long term deployment of national assets
- Undertake the role of [Liaison Officer](#) when required at nationally co-ordinated incidents

Control measure – Define the area of operations

Control measure knowledge

The area of operations is the geographic area that contains all active operations. It can be sub-divided into segments to indicate areas of responsibility or tasks. Intelligence reports will contribute to defining the area of operations and the development of a common operational picture (COP).

Segments are areas with boundaries that are used to identify smaller parts of the area of operations. Segments are about where to conduct tasks.

Sectors are about how to conduct tasks. A sector will have a sector commander who will be responsible for the conduct of any tasks that are assigned.

A segment can contain multiple sectors or it can contain one sector.

Sectors identified for search-related tasks should be searchable within an operational period for the assigned asset and have clearly identifiable boundaries. There should be a clear plan of action to deal with flood casualties and survivors.

Strategic actions

Fire and rescue services should:

- Adopt the processes contained in the [Defra 'Flood rescue concept of operations'](https://www.gov.uk/government/.../flood-rescue-concept-of-operations) <https://www.gov.uk/government/.../flood-rescue-concept-of-operations>.

Tactical actions

Incident commanders should:

- Develop tactical guidance and support arrangements in conjunction with other emergency services and relevant agencies for the area of operations and common operating picture
- Ensure information on deployment with the area of operations is communicated to all multi-agency personnel
- Ensure all multi-agency personnel are briefed on the common operating picture

Control measure – Use search and rescue cell search planning considerations

Control measure knowledge

Determining requirements for search resources is difficult to judge. Considering the search asset's speed of advance and the distance required to cover can help planning. This may need to include the duration of any specific tasks that are required.

As a guide, an estimated speed of advance for teams wading through water is from 500m-1km per hour. An estimated time to gain entry into a house and conduct a primary search of easy-to-access rooms is from 10-20 minutes.

Strategic actions

Fire and rescue services should:

- Ensure local planning considerations and contingencies are developed and co-ordinated in conjunction with local resilience forums, partner agencies and volunteer organisations

Tactical actions

Search and rescue cell search planning considerations

Incident commanders should:

- Be aware of local and national search and rescue planning considerations and contingencies
- Ensure planning considerations and tactics are adopted during emergency deployment of multi-agency personnel
- Exercise command and control techniques to manage self-deploying volunteer teams
- Consider the safe use of self-presenting volunteers as part of a pre-defined plan of action

Control measure – Use safe working practices to deal with pets and animals

Control measure knowledge

Flood survivors may have pets and animals that need to be dealt with during the follow-on rescue effort. The RSPCA has a flood rescue capability and will be able to provide advice and assistance in dealing with animals.

Small animals can usually be dealt with by using animal cages and responders should consider having a supply of them. Dogs may require muzzling before being transported and large animals may require specialist equipment to move them.

Large numbers of dead animals may become a public health hazard if not managed.

Caution should always be exercised by emergency responders when dealing with animals because of their unpredictable nature and potential to cause harm or injury. Wherever possible, expert assistance should be requested.

For further guidance on animals, refer to National Operational Guidance: [Operations](#) - Health, Safety and Welfare – Hazards that exist at every incident

Strategic actions

Fire and rescue services should:

- Liaise with RSPCA and/or other animal associations in conjunction with the local resilience forum to develop tactical plans and contingencies

Tactical actions

Incident commanders should:

- Ensure local tactical plans and contingency arrangements are followed
- Ensure the safety of personnel dealing with pets and animals by using of appropriate PPE and procedures
- Ascertain information on animals and pets before committing personnel
- Request specialist advice and/or support wherever possible or appropriate

Control measure – Manage emergent volunteers

Control measure knowledge

Well-meaning volunteers may self-present or self-deploy at incidents and responders should take into account the best approach to manage them. Management may be required to protect them and stop them from obstructing operations.

Some volunteers can help operations. But care is needed to avoid putting members of the public in undue hazardous situations. Responders may consider asking such volunteers to assist with lower-risk activities such as welfare provision.

A management system may be needed to help deal with large numbers of volunteers and suitable records should be kept of those who assisted. If volunteers are difficult to manage, incident commanders may, as a final resort, consider using the police to invoke the Emergency Workers (Obstruction) Act 2006.

Strategic actions

Fire and rescue services should:

- Develop suitable and sufficient local arrangements in conjunction with local resilience forums and volunteer organisations – see the Defra Flood rescue concept of operations <https://www.gov.uk/government/.../flood-rescue-concept-of-operations>.
- Develop tactical guidance for volunteer assistance to emergency service operations

Tactical actions

Incident commanders should:

- Consider the safe use of self-presenting volunteers as part of a pre-defined policy or plan of action
- Ensure emergent volunteers are guided to a place of safety and provided with appropriate information and advice
- Consider the use of police resources to control members of the public or volunteers

Control measure – Consult and liaise with the Fire and Rescue Service National Co-ordination Centre (FRSNCC)

Control measure knowledge

Early warning can allow specialist mutual aid teams to be requested early and pre-deploy to the area.

When reporting a major or wide area event and requesting mutual aid:

- The impacted authority identifies risk of a flood event requiring additional specialist flood rescue assets
- The impacted authority requests assistance via the [FRSNCC](#)

Tactical advisers (TacAds) are appointed by the national co-ordination centre and are trained and experienced individuals that can provide a valuable resource, primarily at tactical and operational levels. They will provide incident commanders with detailed advice on flood rescue capability. TacAds will be mobilised to provide technical advice, not to assume command.

The FRSNCC will only mobilise qualified TacAds who are available for national deployment.

Information required from requesting authorities

Affected authorities who request assistance should contact the FRSNCC, giving the following information as a minimum:

- Location of incident or expected time and location of impact
- Name of incident commander
- Nature of incident and any specific hazards (i.e. known chemical contamination)
- Prevailing weather and (where known) water conditions
- Estimated number of people requiring rescue
- Local resources already in attendance and/or available
- Estimate of mutual aid resources required
- Location (grid reference/name and address) of rendezvous point or strategic holding area
- Local access issues created by the flooding

Command and Control (Source: Defra)

The arrangements for national co-ordination of flood rescue teams providing mutual aid do not affect established incident command and control arrangements. Once deployed, specialist water rescue teams will always come under the direct control of the requesting authority. They will be managed through existing strategic, tactical and operational incident management systems.

Where major operations are expected, fire and rescue services may establish a strategic holding area (SHA) in or near to an affected area. Incoming teams will be briefed, credentials established, tasks allocated according to their capability and local guides assigned. A flood rescue tactical adviser (TacAd) will review the personnel and equipment to assist in tasking the most suitable team.

Resources deployed from SHAs should be gathered at forward operating bases (FOBs), which will act as the local hubs for tactical operations in the specified flood sector. FOBs will normally be located at the closest accessible fire station(s) to the flooded area. These locations should be secure from flooding with protected access routes and power supplies, as well as sufficient space to host incoming resources. Local emergency service personnel should be assigned to FOBs to act as guides to incoming teams, who will need their local knowledge to help them move effectively around the area.

The 'lily pad' concept is an important operating principle in flood rescue operations. Swift water rescue teams capable of working in high hazard environments, and typically operating in small, high powered craft will carry out rescues and transfer casualties to temporary refuges, called lily pads. From these places of

relative safety, casualties can be evacuated in slower time using other resources, and the specialist teams can return to the rescue zone. Air operations apply the same principles, where dedicated search and rescue helicopters perform short-haul rescues to the lily pad, for transfer to transport helicopters or ground vehicles. Larger vessels may perform an equivalent function to lily pads, acting as mother ships for small rescue craft and search and rescue helicopters. In all circumstances, it is critically important to focus the limited number of specialist teams on life-saving rescue activity and to strictly limit any tendency to use them for evacuation and transport roles that could be carried out by other means.

A 'beachmaster' should be appointed at the landing point for each lily pad to log and track casualties as they are brought ashore and to manage the re-supply and turnaround of rescue teams. Without a clearly nominated beachmaster, landing points could deteriorate rapidly into chaos and the tempo of rescue quickly fall. This is a suitable role for a robust and confident uniformed police or fire junior officer or military NCO.

A dedicated line of communication should be maintained with the appropriate tasking authority. Someone should be allocated to manage calls and record data. A similar line of communication should be maintained with the FRSNCC to monitor the despatch and travel details of flood rescue assets.

Radios should be distributed to flood rescue assets as required. The credentialing process will identify the communications used by teams.

Strategic actions

Fire and rescue services should:

- Develop tactical guidance to inform and advise personnel of actions to take when adopting the Fire and Rescue Service National Co-ordination Centre protocols

Tactical actions

Incident commanders should:

- Be aware of the Fire and Rescue Service National Co-ordination Centre protocols and implement them when required

Control measure – Use accreditation of flood rescue agencies

Control measure knowledge

- Agencies which declare their resources to the Defra Asset Register are expected to maintain their respective teams in accordance with the Defra [Flood rescue concept of operations](#). They should pay particular attention to the training, equipment and team typing documents that have been consulted on and agreed.

Strategic actions

Fire and rescue services should:

- Use the Defra National Asset Register to identify potential partner agencies. Details are contained in Defra [Flood rescue concept of operations](#)
- Liaise and make arrangements with flood rescue agencies regarding flood rescue response

Tactical actions

Incident commanders should:

- Be aware of any arrangements, memorandums of understanding and mutual assistance agreements with partner agencies
- Use the services of partner and/or multi agencies when required to support operational response

Environmental impacts (biosecurity)

Hazard	Control measures
Environmental impacts (biosecurity)	Use check, clean, dry procedure

Hazard knowledge

Whenever emergency services attend water related incidents, there is potential for cross contamination and subsequent environmental damage.

Invasive non-native species can have a damaging impact on British plants, animals and ecosystems by spreading disease, competing for habitat and food and by predatory behaviour. Plants can grow profusely and block waterways while some animals can damage river banks, affecting economic uses of the environment and adding significant management costs. Species such as killer shrimp, floating pennywort, zebra mussel, water primrose and quagga mussel can be found in British waterways.

Personnel may unknowingly be helping to spread invasive species from one water body to another via equipment, shoes and clothing. This can happen when transferring water from an area which may be susceptible to invasive species to another, for example, when pumping out contaminated flood water. If we spread invasive species, we are potentially causing irreversible harm and may be breaking the law.

For further information see National Operational Guidance: [Environmental protection](#).

Control measure – Use check, clean, dry procedure

Control measure knowledge

All PPE, clothing and equipment should be thoroughly inspected. Any debris (mud, plant or animal matter) should be removed and left at the water body. Particular attention should be paid to the seams and seals of boots and waders. Any pockets of pooled water should be emptied.

Equipment should be hosed down or pressure-washed on site. The resulting contaminated water should be contained on site and not be allowed to enter any other watercourse or drainage system. Dipping clean equipment in disinfectant solution will kill diseases and is unlikely to kill non-native species. However, submersion in hot water for 15 minutes is an effective biosecurity measure. If facilities are not available, on site equipment should be carefully contained.

The best way to disinfect clothing and equipment is to thoroughly dry it. Equipment should be dried for 48 hours before being used again. The drying process should be thorough, as some non-native species can

survive for 15 days in damp conditions and two days in dry conditions. At an incident this may not be possible, so alternative methods should be considered.

Strategic actions

Fire and rescue services should:

- Liaise with the environment agencies to develop tactical support, guidance and mutual understanding to provide assistance and inform personnel of the hazards and actions
- Develop and maintain appropriate records for sites of special scientific interest and Site-Specific Risk Information (SSRI)

Tactical actions

Incident commanders should:

- Gather information for water related environmental hazards
- Put appropriate control measures in place to limit any environmental impacts
- Liaise with the environment agencies to for advice and support
- Ensure all personnel and equipment are effectively decontaminated following contact with any biosecurity hazards

Vehicle in water

Hazard	Control measures
Vehicle in water	Stabilise and anchor the vehicle Use trained and equipped personnel in the hot zone Avoid entering the vehicle

Hazard knowledge

Incidents in water involving vehicles can present significant hazards to emergency service personnel, members of the public and trapped people.

During periods of inundation, uncontrolled flows of water can pick vehicles up and propel them at speed onto or into hazardous areas, for example, electrical installations, deeper water and areas where members of the public are trapped or where rescuers are working.

Even with all windows open a car may initially float away from the point of entry. The electrical systems and power windows may still work for a time, even if a vehicle is full of water. Once a vehicle is full of water other factors will influence what happens, including the underlying surface, water current, and weight and distribution of passengers or load.

If the vehicle is side-on to the current on a solid riverbed in flowing water, a vehicle roll is almost inevitable. Even in slow currents, a vehicle may be rolled a considerable distance. If a vehicle lands on its wheels on a soft bed (i.e. mud, sand or small stones), each tyre will create an eddy, scooping out mud and sand until the vehicle settles onto its chassis.

If a vehicle comes to rest more or less straight in line with the current, the water pressure will sink the upstream end of the vehicle deeper than the downstream end. However, it is the mass of the vehicle that will determine its position. It is common for a vehicle to pivot around its engine as this is the heaviest part.

Should a vehicle come to rest or become wedged against an obstacle, an eddy may present a seemingly safe area to work from. However, the obstacle or object may suddenly move due to its compromised stability, causing the vehicle to rotate, roll or move while rescue operations are being attempted.

Control measure – Stabilise and anchor the vehicle

Control measure knowledge

Anchoring a vehicle may be necessary to reduce the likelihood of it moving. In doing so, apply necessary control measures to mitigate the hazards to emergency service personnel, members of the public and anybody trapped inside the vehicle.

Generally, vehicles in water can be categorised as:

- Fast water immersion
- Still water immersion
- Deep water immersion
- Shallow water immersion

And sub-categorised as follows:

- Intact or damaged and upright
- Damaged and rolled or inverted

Strategic actions

Fire and rescue services should:

- Identify appropriate techniques necessary to perform all reasonably foreseeable tasks
- Provide tactical support and guidance to provide assistance and inform personnel of the hazards and actions

Tactical actions

Incident commanders should:

- Work closely with other emergency services to apply the survivability model when deciding on the need for stability of an immersed vehicle and rescue options
- Consider the possibility of air pockets maintaining the buoyancy of a vehicle in deep water
- Carry out an assessment of the requirement to stabilise and anchor a vehicle taking into account:
 - The need for specialist extrication techniques
 - Urgency of rescue
 - How the vehicle is positioned (i.e. immersed or submerged)
 - Location of casualty in the vehicle
 - Accessibility and stability of the vehicle

- The depth and flow of water around the vehicle

Control measures – Use trained and equipped personnel

Control measure knowledge

To carry-out a successful technical rescue from an immersed or submerged vehicle, incident commanders should consider the level of knowledge, skills and understanding of personnel and the availability of appropriate resources at the scene.

Fire and rescue services should be aware that some water rescue course providers do not have the means to deliver training for rescuing people from and the stability of vehicles in water. Fire and rescue services will therefore need to consider the requirement for personnel to be trained as part of their risk management and planning process.

Strategic actions

Fire and rescue services should ensure:

- Personnel are trained specifically in dealing with rescues from vehicles in water and that effective systems are in place to enable full briefings to take place on the tasks they are to perform. Training should include techniques for stabilisation and rescue from vehicles in water, associated hazards and control measure and theory regarding the behaviour of vehicles in water
- As part of the service risk management and planning process, service should identify areas where a pre-determined attendance of specialist resources will be required.

Tactical actions

Incident commanders should:

- Use only those personnel with the requisite skills, knowledge and understanding for performing tasks in the hot zone.
- Ensure the hot zone is clearly indicated and effectively communicated
- Consider the specialist tasks to be performed in water, for example, stabilisation and rescue
- Consider the specialist resources required to perform the tasks, for example, technical, swift water rescue equipment and teams
- Request the attendance of specialist resources where required
- Reassure casualties and instruct them what to do to assist during any rescue attempt
- Use appropriate and effective methods of communication and equipment
- Ensure consistent liaison and planning with the water rescue team leader is maintained

Control measure – Avoid entering the vehicle

Control measure knowledge

Entering an immersed, partially submerged or completely submerged vehicle can be extremely hazardous. Vehicles can suddenly shift with movement or an increase in depth of the surrounding water, ultimately trapping rescuers inside and/or causing physical injury.

The dynamic assessment should pay particular attention to the window of opportunity to save saveable life using safe working practices and competent personnel to carry out tasks. This may mean considering the speed of water flow and/or how quickly an area is becoming inundated, the depth of the water and the likely path of travel the vehicle may take. For example, rapidly washed a significant distance away or sinking in deep water, mud or ice.

Rescuers should avoid entering a submerged or partially submerged vehicle as this may affect its stability, potentially resulting in entrapment.

Strategic actions

Fire and rescue services should:

- Develop tactical guidance and support arrangements for the hazards and actions to be taken when people are trapped in a submerged vehicle

Tactical actions

Incident commanders should consider the following before taking action to carry out a rescue:

- Availability of required specialist teams and equipment
- The level of crews' knowledge, skill and understanding
- Water level in relation to the vehicle and its stability
- The depth of the water immediately adjacent to the vehicle
- The speed at which an area is becoming inundated with water
- Surrounding hazards in the immediate vicinity of the incident which could become involved
- Availability of access to the vehicle from the upstream side
- An underwater search and recovery team should be requested when an incident involves a submerged vehicle, or where it is not possible to safely assist without sub-surface equipment
- Attaching buoyancy aids, PFDs or other suitable floatation equipment via suitable ropes can identify the location of the vehicle when rescue attempts are aborted due to an unsafe escalation of water flow or depth

Other bodies of water or waterways

Hazard	Control measures
Other bodies of water or waterways	Develop knowledge of terminology and operating systems Establish and implement procedures for surface rescue/recovery Establish and implement procedures for sub-surface rescue/recovery

Hazard knowledge

Locks and canals

A network of over 2,000 miles of canals and rivers are readily accessible in the UK for a variety of leisure activities. Incidents may occur in remote locations with limited or no vehicle access. Incidents may occur with people in difficulty in a lock or a vessel that has capsized with a casualty inside.

When operating adjacent to locks and canals cordons should be in place to minimise the likelihood of falls from height due to wet, slippery lock edges and trip hazards and to keep members of the public away from the scene. Crews need to be aware of the hazards associated with cold deep water, contaminated water and underwater hazards from submerged debris.

Locks have the potential for sluices and submerged pumps and therefore associated entrapment hazards. Potential contamination exists from fuels, biological waste, litter and general commercial debris.

Quarries and reservoirs

Both quarries and reservoirs can be inherently dangerous places and pose significant hazards to members of the public who visit these sites for recreational activities, including walking, fishing, swimming, climbing and diving.

Quarries can be classified as either working or non-working, and water can reach depths of more than 30m. After a quarry is abandoned, it is usually secured to prevent access. However, unauthorised access is a major issue in the UK as well as being used as illegal dumps, giving them the potential to contain many hazardous materials.

Emergency access and egress to non-working quarries can be difficult due to security fencing. Roads or pathways that have been constructed as a temporary fixture may be in a state of disrepair.

Reservoirs may be in remote locations with limited access, quite commonly but not exclusively located in river valleys.

Typical sites for quarries and reservoirs involve areas of unconsolidated faces of superficial deposits, particularly sand or gravel, and high, steep faces with or without loose rock debris where falls from height exist.

Docks

Docks are often busy and hazardous places with large vessel movements, heavy machinery, confined spaces, sluices and subsurface hazards. Docks can also attract unauthorised access from members of the public, particularly during periods of warm weather.

Urban development and regeneration of former dockland areas has led to residential housing and large restaurant, bars and club complexes being built in close proximity to large areas of open water.

HM Coastguard is responsible for co-ordinating search and rescue incidents in docks associated with tidal rivers, unless there is specific local agreement with police or harbourmasters.

Control measure – Develop knowledge of terminology and operating systems

Control measure knowledge

Crews should be familiar with the terminology and operating systems associated with canals, locks, quarries, reservoirs and other structures in their area such as lift and swing bridges. Docks may contain a number of additional hazards which will need to be considered such as moving heavy freight, cranes, fork lift trucks, boat or ship mooring lines and dry dock areas. Controls to any operating systems on or around any waterway should be secured prior to any rescue attempt.

The following terminology and operating systems are common to UK waterways:

Canals	
Basin	A length of wide canal or a side 'pond', for vessels to moor and un/load cargo
Coffer dam	A temporary but substantial measure to exclude water during a long-term stoppage
Contour canal	A waterway that 'meanders' the geographical land contours
Locks	
Balance beam	The long arm projecting from the landward side of the gate over the towpath
Chamber	The main structural feature of a lock
Cill or sill	A narrow horizontal ledge protruding a short way into the chamber from below the upper gates
Doubled, paired or twinned locks	Locks built side by side on the same waterway
Flood locks/gates	To prevent a river from flooding a connected waterway
Gates	The watertight doors which seal off the chamber from the upper and lower pounds
Hydraulic paddle gear	Hydraulic system for operating paddles, especially those on bottom gates, which are the heaviest to operate
Lock flights	A series of locks in close-enough proximity to be identified as a single group
Paddle	The simple valve by which the lock chamber is filled or emptied
Pound	The level stretch of water between two locks (also known as a reach)
Rise	The change in water-level in the lock
Staircase locks	Where a very steep gradient has to be climbed, a lock staircase is used
Swell or swelling	Caused by opening suddenly the paddle valves in the lock gates, or when emptying a lock
Turning a lock	Either emptying a full lock or filling an empty one
Winding gear or paddle gear	The mechanism which allows paddles to be lifted (opened) or lowered (closed)
Windlass or lock key	A detachable crank used for opening lock paddles
Reservoirs	
Aerators	Mix thermal layers in summer in some reservoirs and they should be marked with buoys. The danger in the area of aerators is a sudden loss of buoyancy caused by the air bubbles in the water
Dams	Have spillways where water is sometimes released to fall to the downstream river, or where a full reservoir overflows
Tower	Normally close to the dam, and contains the pipes that take water off for use, whether that's to be processed for drinking or for hydro-electric power

Strategic actions

Fire and rescue services should:

- Provide tactical support and guidance to inform personnel of the terminology and associated operating systems and equipment used in and/or on locks and canals, quarries, reservoirs and docks
- Liaise with responsible persons and/or relevant authorities to produce Site-Specific Risk Information (SSRI) for waterways within the area of the fire and rescue service

Tactical actions

Incident commanders should:

- Be aware of the terminology and associated operating systems used on specific waterways
- Ensure any operating system controls are secured and/or safe working areas are clearly defined, prior to commencing operational activities
- Provide effective briefings to all personnel including information regarding terminology and associated operating systems

Control measure – Establish and implement procedures for surface rescue/recovery

Control measure knowledge

When attending incidents on canals, all lock gates and paddles should be completely closed before any rescue attempt. Personnel should not attempt to open the lock gates or paddles to empty the lock. When a sluice or lock gate is opened to release water, strong currents and turbulence can occur downstream.

Where possible, an exclusion zone should be established on the high-pressure side of the lock gates and paddles.

Access to the lock should be via the fixed raking ladder. Mud and silt will be present on the canal bottom and lock walls.

Strategic actions

Fire and rescue services should:

- Ensure personnel are informed of and, where required, acquire the appropriate and specific skills, knowledge and understanding to safely operate in the various waterways located in the area of the fire and rescue service
- Develop tactical support and guidance arrangements with the co-operation of lock, canal and quarry operatives or authorities, port or dock authorities, and HM Coastguard where docks lie in tidal waters (including SSRI), to inform personnel of the information and safe working systems used to effect rescue and recovery

Tactical actions

Incident commanders should:

- Refer to Site-Specific Risk Information (SSRI)
- Identify and ensure crews are aware of the site specific hazards
- Implement control zones and cordon areas to control personnel and eliminate or minimise public hazards
- Liaise with site responsible person(s) and lock or canal operatives to develop and implement tactical plans
- Devise and implement an effective plan to control boat traffic and water users
- Use trained and competent personnel to carry out tasks involving surface rescue and recovery
- Request additional specialist resources where required for rescue and recovery including specific water related specialisms and/or rope or technical rescue

Control measure – Establish and implement procedures for sub-surface rescue/recovery

Control measure knowledge

Any attempt to drain the lock should consider the potential of trapping the casualty or victim. A 50mm gap will create sufficient pressure to pin a person. Where the incident involves a casualty below the surface of the water and it is not possible to assist without sub-surface equipment then a specialist underwater rescue and recovery team should be requested.

More information on canals can be found here:

<http://canalrivertrust.org.uk/about-us/for-businesses>

<http://canalrivertrust.org.uk/boating/navigating-the-waterways/boaters-handbook>

Strategic actions

Fire and rescue services should:

- Ensure personnel are informed of and, where required, acquire the appropriate skills, knowledge and understanding to safely operate in the various waterways located in the area of the fire and rescue service
- Develop tactical support and guidance arrangements with the co-operation of lock/canal and quarry operatives or authorities, port or dock authorities, and HM Coastguard where docks lie in tidal waters (including SSRI), to inform personnel of the information and safe working systems used to effect rescue and recovery

Tactical actions

Incident commanders should:

- Refer to Site-Specific Risk Information (SSRI)
- Be aware of and ensure crews are aware of the site specific hazards
- Implement control zones and cordon areas to control personnel and eliminate or minimise public hazards
- Liaise with site responsible person(s) and develop and implement tactical plans
- Devise and implement an effective plan to control boat traffic and water users
- Use trained and competent personnel to carry out tasks involving surface rescue/recovery
- Request additional specialist resources for rescue and recovery including specific water related specialisms and rope or technical rescue

Glossary

Term	Acronym	Description
Backwash		Water flowing back toward the dam face. Water in the backwash can be highly aerated. Aerated water may not support a person at the surface.

Term	Acronym	Description
Beachmaster		A nominated person who will exercise command and control of forward operations within a given area of operations. Similar to the role of sector commander
Boil Line		Distinct feature that separates the backwash from the outwash. Water in this area appears to bubble like water boiling in a pot. Boats that cross the boil line will have a significant reduction in performance with both propeller and jet drive units
Cold zone		This is the area beyond the inner cordon i.e. the safe area located outside the hazard zones where equipment dumps, casualty reception/holding areas and marshalling areas should all be located
Cold water response (shock)		The body's short term involuntary response to being suddenly immersed in cold water
Cold water		Cold water shock is possible in water temperature of 25°C but becomes of dominant concern at temperatures less than 10°C. The waters around the UK are officially cold (10 - 15°)
Community Risk Register		An assessment of the risks within a local resilience area agreed by the local resilience forum as a basis for supporting the preparation of emergency plans
Cruse		Charitable organisation offering bereavement counselling, advice and support throughout the UK
Decontamination point		The position on the inner cordon at which decontamination is carried out
Department for Communities and Local Government, Resilience and Emergencies Division	DCLG-RED	DCLG-RED act as a conduit for communications between central government and the local level. They are responsible for supporting local response and recovery efforts, and ensuring that there is an accurate picture of the situation in their area Function transfers to Home office on 1 April 2016
Department for Environment Food and Rural Affairs	Defra	The lead government department responsible for policy and regulations on the environment, food and rural affairs. Is also responsible for minimising the impact of emergencies on food production, fishing and farming
Downstream		That portion of the river which is farther from the river's source than the reference point
Ebb current		Once high tide occurs, the ebb current (outgoing tide) will start. This current moves away from the shore
Eddy		An eddy is the swirling of a fluid and the reverse current created when the fluid flows past an obstacle. The moving fluid creates a space devoid of downstream-flowing fluid on the downstream side of the object. Fluid behind the obstacle flows into the void creating a

Term	Acronym	Description
		swirl of fluid on each edge of the obstacle, followed by a short reverse flow of fluid behind the obstacle flowing upstream, toward the back of the obstacle. This phenomenon is most visible behind large emergent rocks in swift-flowing rivers
Emergency Services Collaboration Working Group		Working group comprising senior leaders from the Association of Ambulance Chief, Executives (AACE), Association of Chief Police Officers (ACPO), Association of Police and Crime Commissioners (APCC), College of Policing, Chief Fire Officers Association (CFOA) and the Local Government Association (LGA) on behalf of Fire Authorities
Environment Agencies Environment Agency (England) Scottish Environmental Protection Agency Natural Resources Wales Northern Ireland Environment Agency	EA SEPA NRW NIEA	All organisations maintains strategic role for the management of environmental issues concerning water, waterways and bodies of water
Environmental Information Regulations	EIR	Statutory information (SI 2004 No. 3391) providing right of access to environmental information held by UK public authorities
Family Liaison Officer	FLO	Police officer designated to carry out an investigation into people believed to be missing and to assist identification by collecting ante-mortem data
Fire and Rescue Maritime Response	FRMR	Specialist fire and rescue service teams strategically located around the country for response to emergencies at sea
Fire and Rescue Service National Co-ordination Centre	FRSNCC	Established to record details of the availability and movement of National Resilience resources on a day-to-day basis. It manages the deployment of assets to major incidents, with a national mobilisation and communications structure based in London
Flash flood		Flash flooding happens when rain falls so fast that the underlying ground cannot cope, or drain it away, fast enough. Roads can become like rivers and if there is a lot of water, it can flood buildings and carry cars away
Flood		An overflow of water onto normally dry land. The inundation of a normally dry area caused by rising water in an existing waterway, such as a river, stream, or drainage ditch
Forward control point	FCP	Provides the initial focal point from which the operational level of

Term	Acronym	Description
		management at the scene will be co-ordinated
Helical flow		Found along a shoreline and is a corkscrew or spring-like current that is constantly rolling and pushing out into the laminar flow. This spiral water flow can sweep a person off their feet and push them into the main current or make swimming back to shore a challenge
High tide		When tide is on the rise, it creates a flood current that moves toward shore. High tide is the peak of the flood current
Hot zone		The area of operational activity involving the high-hazards i.e. the area covered by water. Zone of the highest level of contamination
Immersion (casualty/rescuer)		When a person enters the water and maintains a clear airway
Inland water categories		Inland waters are classified as one of four categories: Category A - narrow rivers and canals where the depth of water is generally less than 1.5 metres Category B - wider rivers and canals where the depth of water is generally 1.5 metres or more and where the significant wave height could not be expected to exceed 0.6 metres at any time Category C - tidal rivers, estuaries and large, deep lakes and lochs where the significant wave height could not be expected to exceed 1.2 metres at any time Category D - tidal rivers and estuaries where the significant wave height could not be expected to exceed 2 metres at any time
Inside Bend		On the inside bend of a river, slower moving water may form an eddy
Laminar flow		The fastest water travelling with no restrictions in a straight line down a river
Liaison Officer	LO	Generic term for a person in an organisation who co-ordinates that organisation's staff at the scene
Local Resilience Forum	LRF	Forum bringing together all the category 1 and 2 responders within a police force area to co-operation in fulfilling their duties under the Civil Contingencies Act
Maritime and Coastguard Agency	MCA	Executive agency of the Department for Transport, comprising Her Majesty's Coastguard and the former Marine Safety Agency
Maritime Rescue Co-ordination Centre	MRCC	Her Majesty's Coastguard regional centre overseeing and co-ordinating the search and rescue operations within a region

Term	Acronym	Description
Meteorological Office	Met Office	The Met Office makes meteorological predictions across all timescales from weather forecasts to climate change as follows:
Missing Persons Enquiry Unit		Element in the Casualty Bureau responsible for receiving enquiries from the public and recording details of missing person
Outside Bend		On the outside bend of a river, the water is faster and deeper and will push the rescuer or boat into the bank. The bank can be undercut with exposed roots or strainers, forming entrapment situations
Outwash		Water below the boil line flowing downstream
Pillows		Occur where the water piles up on the upstream side of an obstruction
Respiratory protective equipment	RPE	Respiratory protective equipment includes breathing apparatus, particle masks and respirators.
River left		Refers to the left side of a river looking downstream
River right		Refers to the right side of a river looking downstream
Sieves		Occur where water is flowing through a narrow or contracted passage such as a crack in rock. Individuals and boats can wedge and get pinned in these restricted passages. Many rivers have well-known sieves that are identified in guide books and on paddling websites
Site Specific Risk Assessment	SSRI	A formal assessment of the risks associated with identified hazardous areas, carried out by the FRS and with the agreed co-operation of other stakeholders where necessary
Slack tide		The weakest tidal currents occur between the flood and ebb currents
Stopper		A form of eddy caused by a rock, log or sudden drop in the river. The return flow within a stopper can hold a person, causing an entrapment hazard
Strainer		A strainer is created by a manmade or natural obstruction such as a tree, root system, fencing, or guard rails
Submersion (casualty/rescuer)		Describes someone who can't breathe atmospheric air because their airway is underwater
Tides		Most areas will have two high tides and two low tides in a lunar day (24 hour and 50 minute period) The weakest tidal currents occur between the flood and ebb currents. This is called slack tide The strongest currents occur near the time of high and low tides

Term	Acronym	Description
		<p>Tidal range is the height between low and high tide</p> <p>Tidal effects also are influenced by the shape of the land and how water may be funnelled through an area. Depth of the water, wind, and weather (tropical storms and hurricanes) also can have significant impact on the strength of tides</p>
Upstream		That portion of the river which is closer to the river's source than the reference point
Undercuts		(Rocks and banks) usually are well-known hazards on a river and often are the site of fatalities. River banks, especially outside bends, are constantly eroded by moving water. The bank becomes undercut, creating an entrapment. Trees can topple into the water from the undermining and create strainers and banksides can become unstable underfoot
Upstream/Downstream V's		Upstream Vs indicate an underwater obstruction, and downstream Vs indicate an open channel
Warm zone		The working area adjacent to the water where there are still significant hazards from uncontrolled entry into the water. The area is usually three metres across
Weir		A low dam built across a river to raise the level of water upstream or regulate its flow