Reference number	N.O.G. CC 028
Date	May 2021

NFCC National Fire Chiefs Council

National Operational Guidance

National Operational Guidance topic	
National Operational Guidance: *Geophysical hazards (First edition version one)*	
Change originator	
NFCC Fire Central Programme Office – National Operational Guidance content team	
Change requested	
Publication of context guidance, which contains some new topics plus some context topics previously contained in the *Water rescue and flooding* guidance. For ease of understanding, current content is displayed as black text, with tracked changes, while new hazards and control measures are displayed as purple text.	
Consultation process	
Open consultation for six weeks	
Changes proposed	**Rationale for change**
Site-Specific Risk Information (SSRI) related to geophysical hazards to be added to the *Corporate guidance for operational activity*, including: • Areas prone to landslides • Areas at risk of coastal cliff collapse • Sinkholes • Naturally occurring radon • Volcanic hazards • Severe weather • Amend existing text of "Ground conditions" to "Ground conditions, including unstable ground"	The aim is for all information relating to the gathering of SSRI to be in a central location to assist with the process
Creation of new hazards and control measures for: • Coastal cliff collapse (to be combined with Landslides)	These topics had either been only briefly referred to in existing guidance or had not been previously considered for inclusion. A pre-review survey suggesting their inclusion, and discussions with the NFCC Operational

• Sinkholes • Naturally occurring radon • Volcanic hazards • Severe weather	Guidance Forum, indicated consensus with this action.
Relocation of hazards and control measures for: • Flooding • Landslides • Unstable surfaces	The guidance for these topics is currently combined with the water rescue guidance, but are types of geophysical hazards. The water rescue content has been redrafted as a standalone piece of activity guidance, to provide a better focus on the topic.
Restructure of the hazard for Flooding, being split into two new hazards: • Working near, on or in floodwater • People at risk: flooding	To provide differentiation between the hazards presented to personnel attending a flood , and the hazards for people involved in a flood.
Updated hyperlinks and links to other sections of guidance	To ensure hyperlinks are still functioning and relevant, and to link to sections of guidance where there have been review changes.
Updates to strategic actions: • Amendments • Additions • Archiving	The strategic actions that support the control measures will be updated as required, as indicated in the draft guidance.
Governance and approval	
NFCC Operational Guidance Forum NFCC Operations Committee NFCC Steering Group	
Impacts on other National Operational Guidance and other products	
Impacts to other pieces of guidance have been identified: • All guidance – check hyperlinks that currently point to content that has been relocated into Geophysical hazards • One of the National Resilience control measures, *Request National Resilience resources for high volume pumps*, covers both water delivery and flood response; it is currently published in Fires and firefighting as well as in this guidance. To make the content more relevant to both pieces of guidance: o The current version of the control measure in the Fires and firefighting guidance will be left in place until the review for that guidance is undertaken o During the Fires and firefighting review, the control measure will have any flood-	

specific content removed and be retitled *Request National Resilience resources for high volume pumps: Water delivery*

- A new control measure *Request National Resilience resources for high volume pumps: Floodwater* has been created in this guidance
- Generic content will remain in both versions of the control measure

- Incident command -control measure *Specialist resources* requires an additional strategic action regarding the establishment of memoranda of understanding
- Operations – control measure *Emergency response plans* requires a paragraph about the health and safety considerations for voluntary and uncategorised organisations attending an incident, with a link to GOV.UK https://www.gov.uk/guidance/how-volunteers-can-help-in-emergencies

Updates to related:

- Training specification
- Scenarios

National Operational Guidance

Geophysical hazards

Initial draft 2021

Contents

Introduction (NEW)

This context guidance is for incidents involving geophysical hazards, including flooding. There are many other sections of National Operational Guidance that may need to be incorporated when responding to these incident types.

Many geophysical hazard events will occur suddenly and require a multi-agency response. The JESIP principles for joint working should be applied whenever there is a multi-agency response, regardless of the type, size or complexity of the incident.

Local arrangements, such as memoranda of understanding (MoUs) and mutual aid arrangements with neighbouring fire and rescue services and other organisations, should consider the benefits of co-operation and communication between emergency responders involved.

Due to the potential widespread or long-term nature of some geophysical hazard events, National Resilience assets may be beneficial or required to achieve a successful outcome, including a return to normality.

Impacts of geophysical hazards on operational response

Some geophysical hazards may have an impact on the operational response of fire and rescue services and other emergency responders. For example, sinkholes may affect the roadway system for an extensive period while repairs are made and therefore have an impact on attendance times.

Fire and rescue services should consider the potential impact of geophysical hazards on their operational response and develop business continuity plans to mitigate the impact.

Fire and rescue services should also be mindful of the potential impact of geophysical hazards on other emergency responders and organisations that may provide advice or assistance at incidents. The demands on all organisations may be overwhelming during a large-scale or long-term geophysical hazard event.

Risk management plan

Each fire and rescue authority must develop their strategic direction through their risk management plan. To determine the extent of their services, strategic managers will consider their statutory duties and the foreseeable risk within their area.

Work to identify risk and prepare operational plans should consider all stakeholders, including local emergency planning groups and the fire and rescue service risk management plan.

Risk management planning for flooding

Risk management plans should consider the foreseeable hazards associated with flooding. This assessment should identify the most vulnerable people and infrastructure in their area. Fire and rescue services should use community risk profiles and flood maps provided by responsible bodies to develop risk management plans.

A common approach to flood planning by fire and rescue services normally consists of three phases:

- Preparation (preplanning) – refer to Fire and rescue service planning for flood response
- Response (mitigating an immediate risk or stopping things getting worse) – refer to Working near, on or in floodwater, People at risk: Flooding and Flood damage to property and infrastructure
- Recovery (a longer-term activity of rebuilding, restoring and rehabilitating the community) – refer to Fire and rescue service flood recovery strategy

Responsibility of fire and rescue services

Fire and rescue services are responsible, under legislation and regulations, for developing policies and procedures and to provide information, instruction, training and supervision to their personnel about foreseeable hazards and the control measures used to reduce the risks arising from those hazards.

This guidance sets out to provide fire and rescue services with sufficient knowledge about the potential hazards their personnel could encounter when attending incidents. Fire and rescue services should ensure their policies, procedures and training cover all of the hazards and control measures contained within this guidance.

Roles and responsibilities for flooding

The Department for Environment, Food and Rural Affairs (Defra) is the lead government department for major flooding in England and Wales; their guidance, Developing a multi-agency flood plan (MAFP), contains details about the roles and responsibilities of Category 1 and Category 2 responders.

The Scottish Environment Protection Agency (SEPA) is Scotland's national flood forecasting, flood warning and strategic flood risk management authority. The Department for Infrastructure in Northern Ireland provides equivalent guidance for flooding.

Environmental agencies in England, Wales and Scotland and the Department for Infrastructure in Northern Ireland are responsible for providing flood maps and defences. Lead local flood authorities should co-ordinate and manage flood planning for areas within their jurisdiction. In addition to their responsibility for flood mapping, environmental agencies have an incident response capability providing flood barriers, mobile water pumps and incident command vehicles. Agencies may request the assistance of the fire and rescue service in filling or constructing temporary barriers.

A national mutual aid scheme has been developed by the Department for Environment, Food and Rural Affairs (Defra) to provide a framework for co-ordinating a rescue response to major flood events. This includes their Flood rescue concept of operations (FRCO), which provides a model for flood incident management for all flood events, from a local deluge to catastrophic wide-area inundation. It includes topics such as:

- How organisations involved should respond to a flood
- Operational instructions for the management and engagement of flood rescue assets
- Standards relating to response, training and equipment for flood rescue assets

- The type and quantities of equipment required according to a team type
- How and to whom that equipment is allocated and located according to a team type
- Training required to operate the equipment in each organisation

This publication should be considered by all responders to establish a standard approach to a flood.

The Ministry of Defence may be requested to provide assistance during a flood. A guide to military assistance during emergencies is set out in Military aid to the civil authorities (MACA). Further information is provided in the Joint Doctrine Publication 02: UK operations: the defence contribution to resilience and security.

Legislation, regulations and guidance for flooding

The following publications and websites are applicable to a flood; some are relevant to emergency planners and responders:

- The Civil Contingencies Act, for England and Wales
- Flood and Water Management Act (England and Wales)
- National Strategy for Flood and Coastal Erosion Risk Management in Wales
- Flood Risk Management Act (Scotland)
- National Planning Policy Framework
- Technical Guidance to the National Planning Policy Framework
- Department for Environment, Food & Rural Affairs (Defra) Guidance for Developing a multi-agency flood plan
- Department for Environment, Food & Rural Affairs (Defra) Flood rescue concept of operations

Although there is no specific legislative duty for fire and rescue services in England to respond to a flood or water rescue, the Fire and Rescue Services Act does make provision for rescuing and protecting people in the event of emergencies, other than fires and road traffic accidents.

The Fire and Rescue Services (Emergencies) (Wales) (Amendment) Order contains an amendment to include a duty to prepare for and respond to floods and rescues from inland waters.

The Fire (Additional Function) (Scotland) Order and The Fire and Rescue Services (Emergencies) Order (Northern Ireland), set out a duty for the Scottish Fire and Rescue Service and the Northern Ireland Fire and Rescue Service to prepare for and respond to serious floods. This includes any floods that cause or are likely to cause a person to die, be seriously injured or become seriously ill.

Hazard – Insufficient preparation for a flood

HAZARD KNOWLEDGE

Floods and floodwater can present significant hazards to responders and communities. Most floods are predictable, through the use of weather and tide forecasting. However, other types of floods may occur with little or no warning. To be able to provide an effective response, fire and rescue services need to identify the potential locations and causes of a flood in their area and prepare appropriately.

Insufficient preparation for a flood may result in:

- Inadequately trained or resourced personnel being mobilised
- Poor situational awareness and tactical planning
- Injury or loss of life to:
    - Public
    - Personnel
    - Other responders
    - Animals
- Disruption to or closure of critical infrastructure
- Failure of utilities and telecommunications
- Impact on fire and rescue services, resulting in reduced resources
- Impact on the activities of Category 1 and Category 2 responders

Floods are moving incidents that follow physical rather than administrative boundaries such as areas represented by resilience forums. They are often long duration, multi-agency events with societal, economic and environmental impacts that can take months or years to recover from.

An inland flood occurs when the drainage is compromised or overwhelmed. Physical processes which contribute to inland flooding include:

- Damage or disruption of pipes carrying water, sewage or other liquids
- Extreme weather
- Breaches in flood defences of rivers or dams
- Blockages in drainage

These processes can occur in combination; their impact may be worse if the ground is already saturated. A lengthy period of severe weather may lead to a similarly prolonged period of very elevated flood risk and worsening ground conditions.

Coastal flooding can occur if storms or tsunamis increase the sea tidal range beyond its normal level. Low pressure and high winds increase the size of waves and the water level of bodies of water. If wind direction, atmospheric conditions and high tides align it can result in major flooding across a

significant area and cause river flooding upstream. The damage caused by storm surges can be extreme; they may affect several areas at once and have a long-lasting impact, stretching resources and requiring a longer-term response.

Short term flooding

Short term flooding can be sudden and often unpredicted, causes may include damage or disruption of pipes carrying water, sewage or other liquids. While the flooding could have an impact on life, structures and infrastructure, once the cause has been controlled or isolated the floodwater will often disperse relatively quickly and is unlikely to require support from fire and rescue services for recovery.

Figure: Image of a building damaged by a water mains failure, courtesy of West Midlands Fire Service

Although the incident may require the services of other agencies, the initial response may be the sole responsibility of the fire and rescue service. Personnel may arrive on-scene without the appropriate equipment to deal with the flood, and may not have the required skills, especially as they may need to enter the water to assist with evacuation.

Medium and long-term flooding

This can be deemed as a period over several days or weeks, with causes including severe weather, high tides or breaches in flood defence.

With the continuing advancement in weather and flooding forecasting, timeframes and the areas likely to be affected can be predicted. Response to such flooding may require local personnel trained in entering floodwater with specialist equipment.

Control measure – Fire and rescue service planning for flood response

CONTROL MEASURE KNOWLEDGE

Due to legislative requirements, fire and rescue services need to consider flooding as part of their risk management plans and establish the activities they are required or willing to undertake to respond to a flood.

If their emergency planning group has identified their area as being at risk of flooding, it would be good practice for a fire and rescue service to:

- Establish and maintain a relationship with the emergency planning group, to provide input and be consulted on the flood risk plan
- Prepare their own plans for delivering an operational flood response for the community
- Prepare their own flood recovery strategy for the community
- Develop business continuity plans to protect fire and rescue service assets and employees

Preparation and planning can reduce the impact, and response and recovery can be more effective and efficient. For medium or long-term flooding, the following should be considered throughout the planning process:

- Floods are multi-jurisdictional and multi-agency incidents that should follow the JESIP principles
- Effective risk assessment based on geographical, hydrological and historical incident data and including analysis of population risk and critical infrastructure
- Effective liaison with weather and environmental agencies to aid the development of operational and strategic intelligence leading up to and during an incident
- Adequately trained and equipped response personnel, including specialist rescuers and tactical advisers
- Effective inter-agency liaison at all levels
- Agreed standards and competences
- A mechanism for co-ordinating response
- Having pre-determined attendance based on accurate and timely warnings

Flood risk planning should include:

- Specific hazards, such as fords and flooded roads
- Hydrology and potential hydrology
- Local infrastructure

- Previous incident data
- Links to weather patterns and data on previous floods
- Climate change impact assessments
- Historical information and markers
- Preplanning documents, such as the flood risk plans established by emergency planning groups

Fire and rescue services should consider gathering Site-Specific Risk Information (SSRI) for locations where there is a significant risk of flooding. Their plans should consider inclusion of:

- Response levels that are flexible and scalable to allow for a variety of flood scenarios
- Reference to preplanning for response, including rendezvous points, appliance marshalling areas and access points
- Protocols for dealing with sites subject to Environmental Permitting Regulations (EPR), Control of Major Accident Hazard (COMAH) and Critical National Infrastructure (CNI)

Personnel should acquire and maintain knowledge of local sites that are at risk of flooding, including their associated hazards. Risk visits, joint on-site training and exercises should be carried out as appropriate to reinforce that knowledge.

Planning for the flood response that may be required should consider the community risk profile, operational standards and the safety of personnel. Response levels should be established and based on the safe systems of work required for each response level. The response levels should consider a range of scenarios, such as:

- Localised flooding to a housing estate, with members of public being trapped by floodwater, without a threat to life; this could be attended by a local frontline pumping appliance with personnel trained to enter the water
- A major flood event, predicted to last for several days, that requires a large-scale deployment of National Resilience assets and specialist personnel

The outcome of all risk assessments associated to flooding should be considered to inform decisions on the flood activities that personnel will be undertake and those that should not be carried out. This will help define the scope of the work activities, the safe systems of work required and any management arrangements.

Flood planning should consider that lead times for a flood may vary, depending on the cause. A phased approach model, for when the preparedness phase should be deployed, needs to take into account that the levels of certainty about a flood and its extent will vary.

Phase	**Considerations**
1. Early warning	• Over five days out • Early alert from a flood forecasting service • Low confidence of exact path and impact

2. Assessment	• Three to five days out • Stronger confidence in path • First official statements and warnings may be issued • Resource considerations begin • Any Critical National Infrastructure that may be affected should be identified and assessed, with mitigation activities considered
3. Preparedness	• Three days to hours out • Key decision-making phase for mitigation and prioritisation • Fire and rescue services should consider and enact business continuity plans, prioritisation and request for national resources • Establish strategic holding areas and command groups
4. Impact	• A few hours to receding of floodwaters • Phase may last for an extended period, depending on weather conditions and consequences of flooding
5. Recovery	• Post-flood rebuilding and recovery • Extreme events, such as a coastal inundation may last several years

Figure: Table showing an example model for preparedness phases

Prepare

When preparing for a flood, fire and rescue services need to consider the impacts on current response strategies and manage the development of any operational policies, procedures and safe systems of work. Joint policies and procedures should be developed with other emergency responders to ensure any safety-related messages can be effectively communicated to the incident ground. Building a common understanding of the procedures among emergency responders is essential.

It is important that the right level of equipment and training is provided to relevant personnel, in accordance with current legislation, and that ongoing resourcing is taken into account when preparing and responding. The National Coordination and Advisory Framework (NCAF) should be considered when preparing for major flood.

Fire and rescue services should consider embedding management arrangements to ensure that preparation for delivering a flood response is effectively maintained.

For further information on preparing for flooding refer to:

- The National Flood Emergency Framework for England
- Environment Agency - England
- Welsh Government
- Natural Resources Wales
- nidirect government services – Northern Ireland
- Rivers Agency in Northern Ireland

- Ready Scotland
- Scottish Environment Protection Agency

Response

The Met Office issues three types of warnings when flooding is forecast; flood alerts, flood warnings and severe flood warnings. Fire and rescue services 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.

Appropriate command structures, including those for specialist functions, need to be established when responding to a flood. These need to take into account the actions of other emergency responders, to ensure the correct safe systems of work are employed, especially for the management of the inner cordon. Supervisory officers need to be appropriately trained and competent to take command of a flood.

JESIP and the Department for Environment, Food & Rural Affairs (Defra) Flood rescue concept of operations (FRCO) provide guidance for a multi-agency response. This includes effective multi-agency management of a flood incident, which requires joint planning and preparation.

Establishing operational strategies, including procedures for working in, on or near floodwater. Most flooding and water related incidents are multi-disciplinary and multi-jurisdictional. Procedures should be developed in conjunction with emergency responders and voluntary rescue agencies, establishing protocols for requesting mutual aid, including air support.

Voluntary or uncategorised organisations

There may be concerns about voluntary or uncategorised organisations and how they will work together with the fire and rescue service from a health and safety aspect. Although health and safety law may not apply to a voluntary or uncategorised organisation, there are many aspects that are considered as good practice and all participants have a mutual duty of care.

Effective preplanning will help develop a mutual understanding of how health and safety considerations are applied. The general principle of reducing risks to as low as is reasonably practical should be followed by all responding organisations. This can usually be achieved by:

- Identifying hazards and risks
- Putting in place control measures and safe systems of work to manage the risks
- Reviewing the impact of the controls on the risks

It may be beneficial for fire and rescue services to establish memoranda of understanding (MoUs) or other arrangements for flood response, and to participate in joint training and exercises. This will help to improve interoperability by gaining an understanding of the capabilities of external organisations when dealing with incidents.

Communication and reporting

Strategic and tactical situational awareness should be developed through the use of effective

communications systems. Such systems should be comprehensive, including the ability to communicate with other emergency responders. Reporting mechanisms, especially from the incident ground, should feed into an intelligence development system that is specific to the specialist nature of flood and floodwater activities. This includes developing a commonly recognised incident picture and appropriately sharing information.

A media strategy should be developed that is aligned with the other emergency responders; this is particularly important during a major flood. The importance of communicating pre-flood warnings through the media, as part of a joined-up local emergency planning groups strategy, should be recognised.

STRATEGIC ACTIONS

Fire and rescue services should:

Revised, new, archive or no change	Strategic action	Reference No. if applicable
No change	Identify areas vulnerable to flooding and develop risk management plans and processes	15663
New	Determine the activities personnel will undertake for a flood	
New	Establish flood risk plans with emergency planning groups if their area has a-risk of flooding	
New	Establish memoranda of understanding (MoUs) with voluntary groups and any uncategorised organisations that may attend and support a flood	
New	Plan how to work with voluntary or uncategorised organisations that may attend and support a flood for their area	
Revised	Consider site-specific flood plans for sites that are risk to significant flooding	15665

TACTICAL ACTIONS

Incident commanders should:

Revised, new, archive or no change	Tactical action
New	Ensure personnel adhere to their service's policy and procedures when responding to a flood

All personnel should:

Revised, new, archive or no change	Tactical action
New	Adhere to their service's policy and procedures when responding to a flood

Control measure – Emergency response plans: Flooding

This control measure should be read in conjunction with Operations - Emergency response plans

CONTROL MEASURE KNOWLEDGE

Given the highly-developed status of weather and flood forecasting in the UK, most flooding can be predicted and incidents should be managed as intelligence-led planned events.

Preparation and planning for flooding can reduce the impact, and response and recovery can be more effective and efficient. Emergency response plans for flooding should be developed with all Category 1 and Category 2 responders to ensure activities are carried out safely and effectively.

The expected impact of a flood may dictate the level of multi-agency involvement. However, the key to success is a clear agreement that is tested through regular training, exercises and management systems. In particular there should be robust arrangements for resolving conflict and this is best achieved through a positive working relationship at operational and strategic level.

Voluntary or uncategorised organisations

Voluntary and any uncategorised organisations that may assist or provide information should be considered during planning phases, in addition to National Resilience assets. This could include community flood action groups, that may provide assistance to communities during floods.

Local emergency planning groups can assist with developing a suitable response with a wide range of voluntary or uncategorised organisations that are likely to attend flooding incidents. It is at this level that working arrangements are established and responders can develop an understanding of capabilities and how to engage effectively. Some Category 1 responders will already have well-established links with voluntary organisations, such as:

- Maritime and Coastguard Agency (MCA)
- Royal National Lifeboat Institution (RNLI)
- Mountain Rescue
- Voluntary and charity ambulance services

For these partnerships, effective capability is well proven at local level. In some cases, the voluntary or uncategorised organisation may play a very significant role in other emergency response work and have specific capability that can enhance flood response.

Emergency planning groups

The Flood Risk Regulations, Flood Risk Management (Scotland) Act and The Water Environment (Floods Directive) Regulations (Northern Ireland) require the assessment and management of flood risks to be carried out by a lead local flood authority in England, Wales and Scotland, and the department for infrastructure for Northern Ireland.

Emergency planning groups establish emergency plans for flooding, which can be referred to by many titles, including ‘flood risk plan’. A flood risk plan is a sub-plan of a local authority major

emergency plan.

Emergency planning groups comprise:

- Local resilience forums (LRFs) in England and Wales
- Regional resilience partnerships (RRPs) in Scotland
- Emergency preparedness groups (EPGs) in Northern Ireland

Flood risk plans

Flood risk plans should include an assessment of the flood risk, based on the combination of the probability of an event happening and the consequences if it occurs. The risk of flooding is dependent on there being:

- A source of flooding, such as a river
- A route for the floodwater to take, known as a pathway
- Something that is affected by the flood, also known as a receptor, such as a housing estate

A flood risk plan typically includes:

- Aim and objectives
- Overview of flooding and specific risks
- Information sources
- Roles and responsibilities
- Response and implementation, covering:
    - Locations at risk
    - Triggers
    - Timescales
    - Resources and equipment
    - Places for safe evacuation
- Recovery
- Communication process
- Contact lists of organisations, contractors and others

Flood risk plans should also consider the lead time needed to mobilise and deploy responders into an affected area before access routes, including roads and bridges, may become impassable or damaged by the floodwater.

Forecasting and flood mapping can indicate the areas likely to be affected, although the creation of flood defences and changes in the built environment may affect the outcome. Historical information, such as markers of water height and distributions, are useful indicators when establishing flood risk plans.

A flood risk plan should be established using the input of all organisations that may need to provide response or support in the event of a flood. The plan should benefit all emergency responders and help to ensure that activities are carried out safely and effectively. As flooding is often complex in nature, with many consequences, it may require a comprehensive and often sustained response from a wide range of organisations.

Flood warnings

Planners need to decide in advance what they will do when they receive a flood warning. The Environment Agency publication, Flood warnings – What they are and what they do, explains the levels and advice for public and operational organisations.

Flood warnings are provided by the Flood Forecasting Centre (FFC) for England and Wales and the Scottish Flood Forecasting Service (SFFS) for Scotland. In Northern Ireland, the Met Office works with the Department for Infrastructure to raise awareness of weather events that may result in flooding impacts for people and property.

The Met Office's Flood warnings guide explains how they work with the Environment Agency (EA), Natural Resources Wales (NRW) and Scottish Environment Protection Agency (SEPA) to constantly monitor rainfall, river levels and sea conditions to forecast the possibility of flooding. There are three types of warning issued by them when flooding is forecast; flood alerts, flood warnings and severe flood warnings.

STRATEGIC ACTIONS

Fire and rescue services should:

Revised, new, archive or no change	Strategic action	Reference No. if applicable
New	Consider joint training, exercising and management systems with all responders for a flood	
Revised	Work with emergency planning groups, emergency responders and other organisations to co-ordinate a flood response	15666
Revised	Establish methods to receive and communicate flood warnings	21749
Revised	Develop methods to support action on receipt of a severe weather warning	21750
Archive	~~Develop information sharing policies to allow identification of vulnerable groups or individuals~~	21751

TACTICAL ACTIONS

Incident commanders should:

Revised, new, archive or no change	Tactical action
Revised	Consider flood risk plans when deploying personnel and resources
Revised	Be familiar with the roles and responsibilities of other organisations that may respond to a flood

Archive	~~Use common terminology contained in the Cabinet Office Lexicon~~

Control measure – Fire and rescue service flood recovery strategy

CONTROL MEASURE KNOWLEDGE

Dealing with response phase of a flood can be relatively short in comparison to the recovery phase. Short-term recovery includes actions taken to assess damage and return normal support systems to minimum operating standards. Long-term recovery can take months, or even years, to complete; it will need to address the human, physical, environmental, social and economic consequences of flooding.

As with response, recovery is not just dealt with by emergency responders and organisations; the private sector, voluntary sector and the community itself may all have an important role. Response and recovery are not discrete phases and they do not occur sequentially. Response and recovery should be integrated and co-ordinated from the outset of the incident.

The recovery process is an integral part of the objectives of the combined response. It extends from the early stages of the response phase, and decisions and actions taken during this period can influence the longer-term recovery outcomes. The lead agency should incorporate the strategic assessment of both the response and recovery needs in parallel wherever possible.

Local authority roles and responsibilities

The local authority has the primary role in restoring normality after a flood. This can include the convening a dedicated recovery management team if appropriate, to support the recovery process. The fire and rescue service should consider liaising with and supporting this team.

Essential utilities, such as power, drinking water and fuel supplies, should be restored as a priority. The recovery management team can undertake an assessment of recovery needs, establish priorities for action and formulate a recovery plan. This plan may include:

- Clean-up operations, removal and disposal of debris and floodwater
- Procedures for clean-up to facilitate insurance claim investigations where necessary
- Providing advice, support and assistance to the community
- Continued provision of short-term facilities for evacuees and people displaced by the event
- Moving people displaced by the flood event from short-term rest centres to more permanent accommodation
- Actions to facilitate the return of displaced people to their homes
- Accounting for costs incurred by the responding agencies and organisations
- Facilitating the provision of humanitarian assistance

Fire and rescue service activities

Fire and rescue services should consider establishing a recovery strategy that supports that of their local authority. Doing so should:

- Ensure efficient use of resources
- Co-ordinate recovery for fire and rescue service sites

As part of their overall strategic assessment of a flood incident, fire and rescue services should give early consideration to the recovery strategy for their personnel, resources and sites affected. This should include:

- Establishing health monitoring and post-incident support for their employees
- Identifying suitable short-term accommodation for displaced fire and rescue service resources to operate from
- Recovery or replacement of equipment lost or damaged in the flood; preplanning for this eventuality will help in this process, which can be resource and cost intensive
- Capturing good practice and lessons learned; for more information refer to Operations - Operational learning

Transition and handover

There needs to be a clear line of handover established to support the transition from response to recovery. The chair of the emergency planning group should agree a date and time for the transition from response phase to recovery phase with representatives of the Category 1 and Category 2 responders, including the fire and rescue service.

STRATEGIC ACTIONS

Fire and rescue services should:

Revised, new, archive or no change	Strategic action	Reference No. if applicable
Revised	Liaise with local authorities and emergency planning groups to develop recovery plans	15664

TACTICAL ACTIONS

Incident commanders should:

Revised, new, archive or no change	Tactical action
New	Consider the flood recovery strategy for personnel, resources and sites affected
New	Assist with the transition from flood response to recovery

Control measure – Business continuity plans for the fire and rescue service: Flooding

CONTROL MEASURE KNOWLEDGE

If the flood risk plans established by the emergency planning group indicate that a fire and rescue service site may be affected, a flood risk assessment should be carried out.

The flood risk assessment should be used to develop business continuity plans for the fire and rescue service. It is important that fire control rooms are fully involved in the business continuity planning process, as they will need to understand the potential impacts on resourcing and mobilisation. In a flood, it is likely that fire control rooms will be receiving a high number of calls, including those from people at risk, who may need water survival guidance.

The business continuity plans should extend from the response to the recovery phase, and include:

- Details of any actions required by personnel for that site if a flood warning is issued
- How the health and safety of fire and rescue service employees will be monitored and maintained, especially if essential utilities may be compromised during flooding
- Whether fire and rescue service assets and resources need to be relocated, in order to protect them and maintain an adequate response
- Potential interdependencies, such as loss of electricity and resulting effect on mobilisation systems
- The potential impact of floodwater on communications, including mobilisation systems and the contingency arrangements required to establish and maintain an operational response
- Consideration as to whether back-up power systems may be affected by floodwater, such as standby generators or uninterruptible power supplies

The inability to access resources, provision of food and clean water, delays in responding and the effects on the lives of responders outside of their employment should be considered during planning for floods, particularly for an extended out-of-area response.

Assessment of the response required during the preparation phase should consider the potential effects on access and egress to fire and rescue sites. It may also be necessary to mobilise or reposition resources to areas identified as not being susceptible to flooding, to maintain or improve the response to all types of incidents. This action should also aim to protect the assets of the fire and rescue service and those of its employees.

While the Department for Environment, Food & Rural Affairs (Defra) Flood rescue concept of operations (FRCO) provides details for operational personnel, non-operational personnel should also be considered as part of the training and response plans for a flooding. For example, they may be required to assist with logistical roles, such as transporting equipment, fuel or welfare facilities.

Ad hoc local arrangements for support may leave fire and rescue service areas exposed if the incident develops. Any requests for mutual aid outside of formal National Resilience arrangements should consider the potential development of the flood and any potential regional or national requests for assistance.

STRATEGIC ACTIONS

Fire and rescue services should:

Revised, new, archive or no change	Strategic action	Reference No. if applicable
No change	Develop business continuity plans for flooding in their area	21748
New	Consider training non-operational personnel who may be required to attend and support a flood	

477 *TACTICAL ACTIONS*

478 Incident commanders should:

Revised, new, archive or no change	Tactical action
New	Consider following flood business continuity plans for response and recovery

479

Hazard – Working near, on or in floodwater (NEW)

HAZARD KNOWLEDGE

There are many reasons why fire and rescue service personnel, equipment and vehicles may need to go near, on or in floodwater. This includes:

- The need to go through a flooded area to attend an incident, which may or may not relate to a flood
- To assist people at risk to evacuate the flooded area
- To protect structures and infrastructure, for example by placing sandbags
- To carry out activities to reduce the impact of a flood, such as:
    - Pumping floodwater away from the area
    - Removing blockages to allow the floodwater to drain away

Assessing the quality of floodwater requires specialist assistance. Unless otherwise confirmed by a responsible agency, floodwater should be treated as contaminated; it may contain biological hazards or hazardous materials. Floodwater may also affect biosecurity, as non-native species may be able to move freely. For more information refer to Environmental protection – Biosecurity.

Suitable and sufficient decontamination arrangements need to be considered, due to the potential health risks associated with floodwater. The Department for Environment, Food & Rural Affairs (Defra) Flood rescue concept of operations (FRCO) provides examples of decontamination capability (page 55).

Hazards in flooded areas can include:

- Fast flowing water
- Entrapment hazards
- Displaced or submerged street furniture
- Lifted drain covers
- Waterborne objects
- Railings or perforated objects may act as strainers when submerged
- Large objects, such as rocks, trees or vehicles, being lifted by the movement and pressure of floodwater
- Contaminated water
- Impact on electrical facilities or water treatment plants
- Limited access and egress, which may be affected by rising waters

Working durations during a flood may be extended and risks to personnel include fatigue and physiological stress.

The hazards to personnel from working near, on or in floodwater are detailed in other sections of National Operational Guidance, including:

- Operations – Driving to incidents
- Operations - Working near water or other liquids
- Operations – Physiological stress
- Water rescue – Hydrological hazards
- Water rescue – Entering the water
- Water rescue – Entrapment or entanglement in water

Restricted access and egress

Transport networks may become impassable as floodwaters rise or if bridges or other transport infrastructure are damaged. Floodwater affecting access routes that had been usable, may become deeper and prevent their continued use.

Planned routes may be blocked by other activity and other routes may be in flood-affected areas. Local authorities may have designated and provided signage to indicate safe evacuation routes for the public; these routes may become congested during a flood. If also used by emergency services, this may affect the speed of evacuation and also delay response times.

Undercutting of riverbanks, or erosion of softer surfaces, caused by floodwater may make surfaces prone to collapse. Saturation of natural surfaces may increase the likelihood of vehicles or personnel becoming stuck or falling into the body of water.

Control measure – Gain and maintain safe access and egress: Floodwater

CONTROL MEASURE KNOWLEDGE

Identifying, establishing and maintaining safe access and egress routes that are unlikely to be affected by floodwater or the development of the incident, will reduce the risk of response times being affected or personnel becoming isolated or stranded.

Personnel should consider the effect of floodwater on vehicles or vessels used to gain access and their continued appropriateness for the task. The position of air intakes or propulsion style of watercraft may preclude their use in certain floodwater depths.

Personnel should be aware of the risk that they may become isolated by changes in conditions; floodwater depth can change rapidly or unexpectedly, and pathfinders may be required to establish safe routes.

Marking out hazardous areas and establishing exclusion routes should reduce the risk of entrapment but will require regular reassessment as the floodwater levels change. Access and egress to the site of operations should be monitored constantly.

Loss of power, isolation by floodwaters and loss of communications may affect the emergency response. The effects of flooding should be considered when establishing areas and locations such as:

- Rendezvous points (RVPs)
- Forward command points (FCPs)
- Tactical co-ordinating groups (TCGs)
- Strategic co-ordinating groups (SCGs)
- Strategic holding areas (SHAs)
- Multi-agency holding areas (MASHAs)

Evacuation and access routes should be assessed for the response during a flood event. Consideration should be given to the potential conflict of the public using identified evacuation routes on the fire and rescue service response to incidents and vice versa. In this event, fire and rescue services should identify and use alternative routes if possible.

STRATEGIC ACTIONS

Fire and rescue services should:

Revised, new, archive or no change	Strategic action	Reference No. if applicable
Revised	Provide access to appropriate information, mapping and forecasting systems to allow the identification of potential impact to access and egress during a flood	21756
Revised	Provide or have access to appropriate vehicles for the use in a flooded areas	21757
New	Consider providing equipment to identify, establish and indicate safe access and egress routes for a flood	

TACTICAL ACTIONS

Incident commanders should:

Revised, new, archive or no change	Tactical action
Revised	Identify, establish, maintain and indicate safe access and egress to the scene of operations and communicate avoidance routes for a flood
Revised	Consider the effects of flooding when establishing areas and locations for resources
Revised	Consider using pathfinders to identify safe routes as the flooding develops
New	Establish and regularly assess exclusion routes for a flood
New	Consider avoiding evacuation routes to prevent potential conflict between response and public use during a flood

Control measure – Safe system of work: Working near, on or in floodwater (NEW)

CONTROL MEASURE KNOWLEDGE

Many of the hazards, and therefore many of the control measures, for working near, on or in water apply to floodwater as well.

Cordons

In floods the cordons may need to extend to and protect a large area, making them difficult to establish and maintain. The cordons may also need to be adjusted as the floodwater rises and falls. For more information refer to Water rescue – Cordon controls: Water rescue.

Communication

When working in floodwater, communication between emergency responders may be more difficult, due to the sound of water and potentially extensive distances. For more information refer to Water rescue – Effective communications: Water rescue.

Personal protective equipment

Personnel working near, on or in floodwater must wear appropriate personal protective equipment. This may be challenging, given the environment they will be working in, potentially for protracted periods and when carrying out a variety of tasks. For more information refer to Water rescue – Personal protective equipment: Water rescue.

Safe entry into the water

Due to the potential hazards of working in floodwater, incident commanders should only deploy the minimum personnel and those who know how to safely enter the water. For more information refer to Water rescue – Safe entry into the water.

Safety officers

As personnel may need to work at some distance from the incident commander, consideration should be given to appointing safety officers who are briefed to, for example, monitor the changes in the floodwater or monitor the activity of personnel when working near, on or in floodwater. For more information refer to Water rescue – Safety officers: Water rescue.

Defined area of operations

The area of operations during a flood may be vast. To help manage wide area flooding, it can be subdivided. Intelligence reports will contribute to defining the area of operations and the development of a common operating picture (COP). The defined area may be dynamic and require updating regularly.

Sectors identified for search-related tasks should be searchable within an operational period for the assigned resources and have clearly identifiable boundaries.

There should be a clear plan of action to deal with flood casualties and survivors, including how to

establish a search box for casualties in floodwater. For more information refer to Water rescue – Clearly defined area of operations: Water rescue.

STRATEGIC ACTIONS

Fire and rescue services should:

Revised, new, archive or no change	Strategic action	Reference No. if applicable
New	Consider providing suitable PPE and equipment for working near, on or in floodwater	

TACTICAL ACTIONS

Incident commanders should:

Revised, new, archive or no change	Tactical action
New	Where possible, establish, maintain and regularly monitor inner and outer cordons for a flood
New	Consider appropriate methods of communication between personnel for a flood
New	Ensure that personnel wear suitable PPE and personal flotation devices when working near, on or in floodwater
New	Only deploy the minimum personnel required into floodwater
New	Consider appointing a safety officer to monitor the hazard presented by floodwater
New	Consider subdividing areas of operations for a flood
New	Consider sectors for search-related tasks with clearly identifiable boundaries for a flood

Hazard – People at risk: Flooding (NEW)

HAZARD KNOWLEDGE

If flooding has been forecast, actions to prevent people from becoming at risk may have taken place. These could include:

- Evacuating people from buildings or locations that may be directly or indirectly affected
- Cordoning off the area that may flood to prevent people or modes of transport from entering
- Closing or rerouting transport networks

However, once an area has flooded, or if the flooding is sudden, there may be people at risk who require the assistance of emergency responders. People may be:

- Trapped in a building affected by floodwater; the water may be inside the building, outside the building or both
- Trapped in a mode of transport in floodwater
- Stranded in transport networks due to power supply interruption
- Stranded on high ground surrounded by floodwater

There may also be reports received about missing people during or following a flood.

If people are not provided with appropriate assistance, they may put themselves at greater risk by entering the floodwater.

The hazards of a casualty actually being in the floodwater, and the control measures for the search and rescue of them, are contained in the Water rescue guidance.

People trapped in a building due to floodwater

Flooding can often lead to people becoming trapped due to water surrounding or entering buildings. Flooding is likely to affect a wide area, leading to multiple people being trapped in buildings and potential widespread interruption to power supplies.

People who have become trapped in a building may not appear to be in immediate danger. However, due to the risks associated with water and the additional risk of water in a building there is still a significant risk of injury or death.

Water can enter buildings through apertures such as doors and windows, air bricks on exposed walls and gaps in the floor. Pressure created by flooding can reverse the flow of drainage systems and pipes, causing water to back-up and enter a building through sinks, toilets, and other drainage systems.

Differences in pressure may cause water to move through semi-permeable materials, such as bricks. If water levels are over a certain height, even a building with property level protection, such as door barriers or sandbags, will start to experience some water ingress.

Water in buildings can compromise the safety of gas and electric supplies to both the building and appliances in the building, causing an increase in fire risk. Water is an excellent conductor of electricity, therefore there is a significant risk of electrocution if water has entered buildings. This may be caused by:

- Touching or operating electrical installations or appliances while standing in water
- Electrical installations or appliances being submerged in water, causing electrification of the water
- Damaged electrical installations or appliances, causing electrification of the water

People trapped in modes of transport in floodwater

People at risk may become trapped in a mode of transport if it is surrounded by floodwater. In low levels of water, modes of transport may be stable; but if water levels rise, they may become buoyant.

Water entering a mode of transport may affect its electrical systems and powered windows, although they may still work for a time, even if it is full of water. Modes of transport are not airtight, and it is unlikely for there to be an air bubble inside it if it submerges.

Control measure – Protecting people at risk from floodwater (NEW)

CONTROL MEASURE KNOWLEDGE

People at risk from floodwater may need to be:

- Provided with advice about whether to evacuate or shelter in place
- Helped to evacuate or reach shelter – for more information refer to Operations – Evacuation and shelter
- Rescued from their location – for more information refer to Search, rescue and casualty care

Pre-mobilisation of resources

Fire and rescue services should consider pre-mobilising resources when a flood warning is issued. This can ensure resources are within the areas like to be affected and provide immediate response. Fire control rooms should be updated on a regular basis on the current situation in relation to people identified as being at risk and current actions being taken.

Fire control rooms should inform other organisations about the fire and rescue service resources deployed, their location and any actions currently being taken. Information should also be requested from other organisations.

Effective communication during a flood

Consideration should be given about the communication methods that can be used during a flood, taking into account the potential impact of floodwaters on utilities such as electricity and aerials.

The multi-agency response to a flood will make it necessary for all organisations involved to regularly

communicate with each other.

If the incident requires local authorities to establish reception centres, or other facilities to deal with evacuated or displaced people, the fire and rescue service should provide them with regular updates. The local authority should detail their requirements, which may include information such as:

- How many people may require assistance
- How many companion animals may be involved
- An estimated time for when facilities will be required, and for how long
- Special needs or requirements

Warn, inform and advise people

Any messages related to flooding should be co-ordinated by the appropriate agency and services should not deviate from publicly issued advice. However, if the advice or water survival guidance needs to be changed, the fire control room and appropriate agencies should be advised as soon as possible.

People may not respond to warnings and instructions. This could be due to many reasons, including:

- Language barriers
- Fear or distrust of authority
- Lack of communication technology, which could be due to the interruption of power supplies

It may be possible to use alternative means of communication to provide flood warnings and instructions, such as pictorial warning systems, translation sheets or community champions. If a flooded area is difficult to gain access to, it may be feasible to request that a police helicopter uses its loudspeaker to deliver the flood warnings and instructions.

If people are in contact with a fire control room, or another emergency service control room, they may be receiving water survival guidance if they are at risk due to flooding. The incident ground and the relevant control room should liaise to ensure the people at risk are being given appropriate advice. The people at risk may need to be provided with instructions to assist with the tactical plan.

Fire control and on-scene personnel should liaise to:

- Establish what survival guidance should be provided to people at risk of flooding or floodwater
- Ensure the survival guidance being given to people at risk reflects and supports the current tactical plan

For more information refer to Operations – Warn, inform and advise people. There will also be a need to raise public awareness, potentially via media channels. For more information refer to Major incidents – Public awareness.

708 *STRATEGIC ACTIONS*

709 Fire and rescue services should:

Revised, new, archive or no change	Strategic action	Reference No. if applicable
Revised	Consider developing pre-mobilisation plans for resources when a flood warning is issued	21752
New	Develop arrangements with partner agencies for the delivery of warnings, information and advice during a flood	

710 *TACTICAL ACTIONS*

711 Incident commanders should:

Revised, new, archive or no change	Tactical action
New	Establish and maintain multi-agency communication during a flood
New	Regularly provide the lead agency and the fire control room about people evacuated or displaced and any further information that may be required for a flood
New	Liaise with the appropriate agency and the fire control room to ensure people at risk in flooding are being provided with the most appropriate message and water survival guidance
New	Liaise with the fire control room if the current message or water survival guidance may be inappropriate

712 Fire control personnel should:

Revised, new, archive or no change	Tactical action
New	Implement available pre-mobilisation plans when a flood warning is issued
Revised	Consider requesting information that may be held by other Category 1 and 2 responders and other organisations
New	Provide regular updates to local authorities of evacuated or displaced people and any further information that may be required for a flood
New	Provide water survival guidance in line with publicly issued advice unless on the instruction of the incident commander

713 **Control measure – Search of the flooded built environment**

714 **This control measure should be read in conjunction with Search, rescue and casualty care –**
715 **Effective search management**

716 *CONTROL MEASURE KNOWLEDGE*

717 The search for a missing person inland, including during a flood, is the responsibility of the police.
718 However, the fire and rescue service have a duty to protect life and could be the first to arrive at a

flood that involves a missing person. The fire and rescue service may be asked to take the lead for the co-ordination of the search for people at a flood.

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 operating picture (COP) and directing mobile, uninjured survivors to reception centres. The initial search phase does not usually include complex rescue activity.

Hasty search: An initial search to identify the location of easily found casualties and perform very simple rescues or extrications. The focus is on establishing the search and request 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. The focus is on the collection of intelligence, such as the number of people in a building and survivor needs assessment.

Secondary search – Low coverage: A more detailed search, including the movement of debris in buildings, clearing street debris to find casualties and a detailed search of debris in areas away from human habitation to find missing people.

Secondary search – High coverage: Full entry into all parts of buildings with the removal of debris, with no further search activity to be conducted on completion. Removal of all debris from areas with human habitation. Extensive search of other debris to ensure a high coverage search, moving debris from one place to another to ensure it is searched. 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; the protection and recovery of evidence should be a considered to support the relevant authorities.

People may be living off-grid or in places that are not registered as accommodation and may need to be located using aerial resources or thermal imaging.

Aerial search: Aerial resources may be requested to search larger flood affected areas. For more information refer to:

- Search, rescue and casualty care – Aerial resources: Drones for search
- Search, rescue and casualty care - Aerial resources: Helicopters for search and rescue

Some aerial assets may be suitable for transferring search teams or equipment to hot spots or lily pads. Lily pads may also be used as a temporary area of relative safety for survivors. For more information refer to Transport - Joint working with helicopter services.

Search in or rescue from floodwaters

If a casualty is known or suspected to be in the floodwater, the Water rescue guidance should be applied.

Casualty care

If a casualty requires first aid or other medical care, the Search, rescue and casualty care guidance

should be applied. The Water rescue guidance contains casualty care specific to that context.

STRATEGIC ACTIONS

Fire and rescue services should:

Revised, new, archive or no change	Strategic action	Reference No. if applicable
New	Liaise with other organisations to develop multi-agency arrangements for searching at a flood	
Archive	~~Ensure incident commanders understand the principles of search co-ordination~~	21709

TACTICAL ACTIONS

Incident commanders should:

Revised, new, archive or no change	Tactical action
Revised	Work with other organisations to co-ordinate a search of the flooded built environment

Control measure – Evacuation and shelter: Flooding

This control measure should be read in conjunction with Operations – Evacuation and shelter

CONTROL MEASURE KNOWLEDGE

It may be feasible to carry out evacuation prior to a flood, if there is a high degree of certainty in the forecasting of its impact.

In some circumstances, vertical evacuation, which is the movement of people to a higher floor in a building, may be considered. This strategy may be unsuitable for some buildings or people, including vulnerable groups. It may not be suitable for longer term flooding as utility supplies, including drinking water, and the health risks associated with flooding may force full evacuation.

Properties affected by flooding may no longer be habitable and the relevant agencies should consider the need for long-term rehousing following evacuation. It may be necessary to evacuate and provide shelter for those living in vulnerable accommodation, including:

- Holiday homes
- Caravan parks
- Campsites
- Houseboats
- Buildings that are unoccupied, derelict or awaiting demolition

Assisted evacuation

There may be people who are not at harm but are physically unable to evacuate due to floodwater. For example, people may be unable to leave their properties as the road for egress has flooded.

Personnel may be required to assist with evacuation if the order for people to evacuate has been issued. Personnel may need to use:

- Fire and rescue service vehicles that are capable of entering water
- Non-powered watercraft, such as a rescue sled
- Wading techniques

While not a rescue, the term assisted evacuation only applies to people who are not in any immediate life-threatening situation.

Fire control and on-scene personnel should liaise to provide information and updates about people who need assistance to evacuate from the effects of flooding or floodwater, and those who have been evacuated.

Animals

Results of search activities may indicate that companion animals or livestock need to be evacuated or taken to shelter as part of the flood response. For more information refer to:

- Incidents involving animals: Animals requiring evacuation
- Incidents involving animals: Animal in water, on ice, or on unstable ground

STRATEGIC ACTIONS

Fire and rescue services should:

Revised, new, archive or no change	Strategic action	Reference No. if applicable
Revised	Work with partner agencies and lead local authorities to develop evacuation plans for a flood	21471

TACTICAL ACTIONS

Incident commanders should:

Revised, new, archive or no change	Tactical action
Revised	Implement evacuation arrangements for people at risk from the effects of flooding or floodwater
New	Identify the number and location of people who need assistance to evacuate from the effects of flooding or floodwater
New	Regularly provide details to the fire control room of people assisted to evacuate from a flood

799 Fire control personnel should:

Revised, new, archive or no change	Tactical action
New	Liaise with on-scene personnel to provide information and updates about the number and location of people who need assistance to evacuate from the effects of flooding or floodwater
New	Provide regular updates to local authorities of people assisted to evacuate from a flood

800 ## Hazard – Insufficient resources:Flooding

801 **This hazard should be read in conjunction with Incident command – Insufficient resources**

802 *HAZARD KNOWLEDGE*

803 Depending on the scale and durations of flooding, local emergency service resources may be
804 overwhelmed by requests for assistance or be insufficient in either numbers or capability. It may be
805 necessary to mobilise National Resilience resources or request military aid under Military Aid to the
806 Civil Authorities (MACA) principles. If a flood is determined to be of sufficient extent in impact or
807 duration, it may be necessary to declare it as a major incident. For more information refer to Major
808 Incidents.

809 The impact of deploying local resources or invoking mutual aid arrangements for a flood, which may
810 be protracted, should be considered. The demand for resources across a region may be challenging
811 especially if the flooding spreads.

812 Working with voluntary or uncategorised organisations that may attend a flood, may result in
813 discrepancies or lack of understanding. This may especially occur if responders are trained to
814 different levels of response such as those detailed in the Department for Environment, Food & Rural
815 Affairs (Defra) Flood rescue concept of operations (FRCO).

816 Incident commanders need to be mindful that when using locally sourced volunteer or
817 uncategorised teams, may be made up of individuals that do not all meet the requirements set out
818 in recognised guidance such as the FRCO.

819 ### Control measure – Specialist resources: Flood response

820 **This control measure should be read in conjunction with Incident command – Specialist resources**

821 *CONTROL MEASURE KNOWLEDGE*

822 In addition to National Resilience resources, including flood response and high volume pump (HVP)
823 capabilities, other organisations, such as the Royal National Lifeboat Institution (RNLI), have inland
824 flood rescue teams that may be able to provide a flood response.

825 For flooding incidents that do not require a national response, resources may be available through
826 local arrangements or memoranda of understanding (MoUs). Any local arrangements for mutual aid

should consider the impact on neighbouring areas of a flood or its potential development.

Watercraft

Watercraft, such as boats or sleds, may be available locally or through mutual aid agreements, and provide functions such as:

- Casualty transfer
- Evacuation
- Conducting searches
- Performing rescues

Any watercraft used should be suitable, considering:

- Depth of water
- Strength and speed of flow of water
- Hazards, including debris that may affect propellers
- Equipment required for the tasks
- Duration of deployment
- Limitations of their use

Watercraft should be operated by personnel or other emergency responders who are trained and equipped for the environment and the tasks required. Safe launching and bail-out sites should be identified prior to deployment of watercraft into floodwater.

Aerial resources

Aerial resources may be requested to assist in surveillance, search and rescue, casualty transfer and deployment of equipment and personnel. For more information refer to:

- Search, rescue and casualty care – Aerial resources: Drones for search
- Search, rescue and casualty care - Aerial resources: Helicopters for search and rescue
- Transport - Joint working with helicopter services

Voluntary or uncategorised organisations

Voluntary or uncategorised organisations may play a very significant role for an emergency response and have specific capability that can enhance flood response.

They may have a broad area of expertise in a specific area, with proven skill levels and a capability that is different to or above Category 1 and Category 2 responders. It is essential to establish their capabilities to ensure operating practices are understood prior their deployment.

Individuals who meet a recognised standard, such as those defined in the Department for Environment, Food & Rural Affairs (Defra) Flood rescue concept of operations (FRCO), should have an understanding of hazard and risk identification, control measures and safe systems of work at a

flood. Those registered as assets should understand that they will be operating within a risk-managed environment and be prepared for the constraints that this might bring.

To support health and safety management of those from voluntary or uncategorised organisations, there is a need to communicate the overarching plan. This should provide them with an understanding about the incident command structure within which they will be expected to operate. If any issues arise, these should be discussed at the earliest opportunity.

Military aid

It may be necessary to request support of the armed forces for a flooding if resources are overwhelmed or to provide a specialist capability. The support of the armed forces to civil authorities in the UK is officially termed Military Aid to the Civil Authorities (MACA). Armed forces can assist with:

- Building flood defences
- Evacuating people
- Providing helicopter support

For further information about MACA refer to the JESIP Joint Doctrine.

Joint training and exercises

If fire and rescue services establish mutual aid, memoranda of understanding (MoUs) or other arrangements for flood response, it may be beneficial to participate in joint training and exercises. This will help to improve interoperability by gaining an understanding of the capabilities of external agencies when dealing with incidents.

STRATEGIC ACTIONS

Fire and rescue services should:

Revised, new, archive or no change	Strategic action	Reference No. if applicable
New	Maintain a directory of emergency contact details for specialist resources that can assist with a flood response	
New	Consider establishing local arrangements or memoranda of understanding (MoUs) with organisations that may support a flood response	
New	Participate in joint training and exercises with other agencies and organisations to improve interoperability at floods	

TACTICAL ACTIONS

Incident commanders should:

Revised, new, archive or no change	Tactical action

Revised	Request appropriate specialist resources for a flood response
New	Ensure watercraft are operated by personnel or other emergency responders who are trained and equipped for the flood environment and the tasks required
New	Establish safe launching and bail-out sites before deploying watercraft in floodwater
New	Establish capabilities of individuals from voluntary or uncategorised organisations prior to their deployment during a flood
New	Communicate hazards and risks identified, the overarching plan and the incident command structure to voluntary or uncategorised organisations that are responding to a flood
New	Co-ordinate the flooding response with voluntary or uncategorised organisations in attendance

Control measure – Request National Resilience resources for flood rescue

CONTROL MEASURE KNOWLEDGE

Much of the information regarding flood rescue can be found in the Department for Environment, Food & Rural Affairs (Defra) Flood rescue concept of operations (FRCO). The information provided in this section of National Operational Guidance seeks to provide high-level detail that specifically involves the fire and rescue service.

Interoperability is critical for routine cross border mutual aid operations and for larger scale incidents involving deployment of national assets. The duty to co-ordinate inland flood rescue lies with the police; they will have primacy during a major flood. During a major flood, flood rescue assets will be deployed from a wide range of organisations, including emergency services and volunteers.

The common objectives for a flood rescue response are:

- Saving and protecting human life
- Relieving suffering
- Protecting property
- Providing the public with information
- Containing the emergency – limiting its escalation or spread
- Maintaining critical services
- Maintaining normal services at an appropriate level
- Protecting the health and safety of personnel
- Safeguarding the environment
- Facilitating investigations and inquiries
- Promoting self-help and recovery
- Restoring normality as soon as possible
- Evaluating the response and identifying lessons to be learned

Therefore, the response of the fire and rescue service may include the provision of additional assets, for example, high volume pumps (HVPs), water rescue and other related activities.

Once a full picture of the potential flood is established, a strategy for dealing with the incident must be developed. This should set the priorities for the management of the event and allow an accurate assessment of operational requirements. To provide a safe and efficient response, it is essential that these resources are capable of operating at an incident and do so under a single unified command system.

Requesting a national response

Assets and skills hosted by individual fire and rescue services, and other agencies, can respond if specifically requested to do so as a national capability and where incident timescales allow. If the fire and rescue service incident commander believes that national flood rescue resources are required, they should use agreed protocols to provide the following information to National Resilience Fire Control (NRFC):

- Location of incident or the expected time and location of impact
- Nature of the incident and any specific hazards
- Prevailing weather and, if known, water conditions
- Estimated number of persons requiring rescue
- Local resources already in attendance or available
- Requirement for urban search and rescue (USAR) teams; they may be able to construct landing platforms, etc.
- Estimate of mutual aid resources required, as detailed in the Flood Rescue of Concept of Operations – this may be flood rescue teams or flood rescue tactical advisers
- Host fire and rescue service point of contact name and contact details
- Initial location for a rendezvous point (RVP), strategic holding area (SHA) or multi-agency strategic holding area (MASHA)
- Safe approach route to the incident, including any access issues caused by the flooding

Hosting a national response

The requesting fire and rescue service may need to provide support to the National Resilience resources, including the following activities:

- Establish the number of resources being provided and identify suitable locations for them such as RVPs, SHAs or MASHAs
- Collate team data sheets on the arrival of flood rescue resources
- Record all flood rescue assets being deployed
- Establish communications protocols with flood rescue resources, including the issue of radios if not already held

- Establish and record agreed call signs for all flood rescue resources
- Nominate a site for each team at the RVPs, SHAs or MASHAs
- Request welfare facilities for flood rescue teams
- Request decontamination facilities for flood rescue teams

STRATEGIC ACTIONS

Fire and rescue services should:

Revised, new, archive or no change	Strategic action	Reference No. if applicable
Revised	Have systems in place to request National Resilience flood rescue resources	22756
No change	Consider pre-determining locations for rendezvous point, strategic holding area or multi- agency strategic holding area	22757

TACTICAL ACTIONS

Incident commanders should:

Revised, new, archive or no change	Tactical action
Revised	Request flood rescue resources using agreed National Resilience protocols
Revised	Establish appropiate rendezvous points (RVPs), strategic holding area (SHAs) or multi-agency strategic holding areas (MASHAs) for flood rescue resources
New	Provide support to the National Resilience flood resources as required

Control measure – National Resilience: Mobilise appropriate assets for flooding

CONTROL MEASURE KNOWLEDGE

When assessing mutual aid requirements consideration must be given to the time of day, distance to be travelled, logistical arrangements including rest and accommodation centres etc. National Resilience Fire Control (NRFC), usually assisted by a National Resilience Officer or a flood rescue tactical adviser (TacAd), will co-ordinate the mobilisation of mutual aid for flood rescue, in partnership with the receiving service.

A system of team typing has been developed for flood rescue teams. This system provides assurance regarding the capabilities of each element deployed and that each operates to a common standard and specification irrespective of the organisation to which it belongs. The Department for Environment, Food & Rural Affairs (Defra) Flood rescue concept of operations (FRCO) provides further details on the specification for each team type.

If assets that are on the national asset register are deployed through local agreements, it is imperative that the NRFC is informed, so that these assets are flagged as not available for deployment elsewhere.

STRATEGIC ACTIONS

National Resilience should:

Revised, new, archive or no change	Strategic action	Reference No. if applicable
No change	Maintain a register of flood rescue assets by gathering updates from the holders of those registered assets, including their current availability	22767
No change	Request flood rescue assets by contacting responder organisations using agreed NCAF protocols for mobilisation; this will either be individual fire and rescue services or a control room or nominated contacts for an external organisation	22768
No change	Maintain a register of qualified flood rescue TacAds, including their current availability	22770
No change	Mobilise flood rescue TacAds as required	22771

TACTICAL ACTIONS

Specialist responders should:

Revised, new, archive or no change	Tactical action
No change	Assist National Resilience Fire Control with the mobilisation of flood rescue assets

Control measure – National Resilience: Accepting flood rescue assets

CONTROL MEASURE KNOWLEDGE

All Flood rescue assets, irrespective of their organisation, will be required to comply with the incident command structure. Upon arrival, all flood rescue assets should produce a pre-prepared team data sheet in accordance with the concept of operations. This should be presented at the RVP, SHA or MASHA, so that each asset can be checked in and directed as appropriate to the incident. Usually a Flood Rescue Tac Adviser performs a 'credentialing' process to assess the capability of responding assets.

Details of incident arrangements, as detailed in the concept of operations, should be provided to the team leaders of the flood rescue assets on arrival at the RVP, SHA or MASHA, including:

- Communications detail
- Logistics, using enhanced logistics support (ELS) protocols
- Mapping or on-scene detail
- Location of casualty landing sites and/or reception centres
- Location of fuel provision for vehicles and powered craft

STRATEGIC ACTIONS

National Resilience should:

Revised, new, archive or no change	Strategic action	Reference No. if applicable
No change	Provide flood rescue supporting documentation for completion by specialist responders	22773

TACTICAL ACTIONS

Specialist responders should:

Revised, new, archive or no change	Tactical action
No change	Ensure that all flood rescue assets are checked in and provided with incident arrangements on arrival, prior to tasking

Control measure – National Resilience: Tasking flood rescue resources

CONTROL MEASURE KNOWLEDGE

The resources to deal with the incident should be matched effectively against the incident need. The flood rescue tactical advisers (TacAds) will provide detailed tactical capability-relevant advice to the incident commander. This will inform the allocation of a specific site for each team within the holding area, with an established means of communication prior to tasking. Different team types should be clearly identified and located accordingly for immediate deployment.

The incident requirements should be recorded and communicated to the flood rescue response that will carry out the tasks required. Teams should be given a comprehensive operational and task specific brief. To ensure flood rescue activity is effectively managed, briefings and records should include elements such as:

- A record of the task to be carried out
- Which flood asset the task has been assigned to
- Start and finish times
- How progress will be monitored
- Search audit
- Decision logs, narratives and action logs
- Handover briefings

A full debrief should be undertaken to capture lessons learned; this should assist with planning for future

1010 *STRATEGIC ACTIONS*

1011 National Resilience should:

Revised, new, archive or no change	Strategic action	Reference No. if applicable
No change	Gather and assess information from debriefs, including any lessons learned that are relevant for specialist responders	22776

1012 *TACTICAL ACTIONS*

1013 Specialist responders should:

Revised, new, archive or no change	Tactical action
No change	Provide briefings to flood rescue teams
No change	Keep records and logs of flood rescue teams briefs and debriefs
No change	Provide regular updates to National Resilience Fire Control via the enhanced logistical support (ELS)

1014

Hazard – Flood damage to the built environment

HAZARD KNOWLEDGE

Property damage caused by flooding can be significant. Short-term cleaning up costs can be high, and water can cause longer term cosmetic damage, warp timbers, cause degradation of structural elements and lead to mould and damp. Scouring by fast-moving water may affect the stability of foundations or cause subsidence.

In addition to the damage caused by flowing water, lateral pressure can create significant forces. The greater the difference between the height of water on either side of an impermeable surface, the greater the pressure created. This pressure can cause structural damage to properties and potentially result in the collapse of temporary or unstable structures.

Structures may be built of partially permeable materials, such as brick. The differences in pressure will cause water to move through semipermeable surfaces, even if all apertures are closed. Over a certain height even a building with protection, such as door barriers or sandbags, will suffer from water ingress.

Secondary effects of flooding include disruption to infrastructure, such as the supply of clean water, electricity and transport and can include damage to Critical National Infrastructure (CNI). Other effects of flooding may include disruption to food and water supplies and health care facilities, potentially resulting in long-lasting damage to the community.

Water treatment works

Water treatment works can be affected by flooding, preventing the production of clean water for drinking and bathing. Prolonged loss can increase the risk of ill health and lead to dehydration amongst vulnerable communities. Although the provision of clean water during an emergency will be considered as part of a response to flood, supplies will be limited and costly. Where possible, water treatment facilities should be protected rather than relying on temporary provision.

Transport networks

Flooding, or resultant landslides, can make transport routes impassable and prevent access and egress to incidents. Roads may become congested as the public attempt to evacuate or find passable routes.

Road or rail networks may be damaged by water or debris, and may not be usable after floodwaters recede. People may become stranded either on transport networks or hubs and may require evacuation.

Control measure – Divert the flow or improve the drainage of floodwater

CONTROL MEASURE KNOWLEDGE

Even during smaller incidents, any diversion of floodwater should be done in consultation with, and the consent of the relevant responsible agency, such as an environmental or land agency, as there

may be unintended consequences. The diversion of water may:

- Affect biosecurity
- Result in the flooding of unaffected areas
- Cause damage to other areas
- Negatively impact the flood management plan

It may be beneficial to establish memoranda of understanding (MoUs) with responsible agencies to determine roles and responsibilities for diverting the flow, or improving the drainage, of floodwater.

Divert the flow of floodwater

It may be possible to divert the flow of water to either prevent flooding or protect assets. This can be achieved by:

- Using pumps to redirect water
- Making use of existing water management systems
- Excavating channels to direct the flow
- Erecting barriers

During larger floods, diverting the flow may allow areas to be protected. Areas of importance should be identified, such as those containing Critical National Infrastructure (CNI), important transport networks or built-up areas. It may also prevent additional hazards, such as contamination of water supplies.

Improve the drainage of floodwater

Removing blockages in drainage systems and waterways is not the responsibility of the fire and rescue service. However, if it is appropriate and safe to do so, removing objects that are preventing floodwater from draining away may prevent or reduce damage. Such action should not be taken until the consent of the relevant responsible agency has been obtained.

STRATEGIC ACTIONS

Fire and rescue services should:

Revised, new, archive or no change	Strategic action	Reference No. if applicable
Revised	Consider establishing memoranda of understanding (MoUs) with responsible agencies for dealing with floodwater	21482
Archive	~~Identify and prioritise risks in their area that may be at risk from flooding~~	~~21483~~
Archive	~~Develop a holistic flood water management plan~~	~~21478~~

TACTICAL ACTIONS

Incident commanders should:

Revised, new, archive or no change	Tactical action
Revised	Identify and consider protecting Critical National Infrastructure and receptors of contamination
Revised	Consider diverting floodwater with the consent of the relevant responsible agency
Revised	Consider improving the drainage of floodwater with the consent of the relevant responsible agency

Control measure – Pumping out floodwater

CONTROL MEASURE KNOWLEDGE

Fire and rescue services may be required to pump out floodwater to prevent or reduce damage to properties and infrastructure. Pumping water may be achieved using mobile pumps, vehicle mounted pumps or high volume pumps (HVP). Any decision to pump water from a structure should consider:

- Why pumping out is being considered and whether damage will be prevented
- Where water will be moved to and what impact it will have, including whether it will affect any undamaged or unaffected areas
- Whether conditions are likely to worsen or reflood a structure, and whether any reasonable action can be taken to prevent this from occurring
- The duration that pumping activities will be required to continue for
- The effect of lateral pressure on a structure; the combination of scouring, water damage and the pressure differential created by lowering the internal water level by pumping, may cause unnecessary structural damage
- The effect removal of water from temporary or unstable structures will have on stability, if water pressures have stabilised
- Whether the movement of water to unaffected areas will affect biosecurity or harm the environment

When making the decision to move large volumes of water, downstream conditions and development of a flood event should be considered. This assessment should include the time lag for water to arrive and probable duration of pumping activities.

During flooding, it may be appropriate to wait for water to subside, rather than pumping out properties during flooding. Once waters begin to recede, pumping water from flooded properties may speed the recovery process but should take place as part of a structured recovery plan.

STRATEGIC ACTIONS

Fire and rescue services should:

Revised, new, archive or no change	Strategic action	Reference No. if applicable
Revised	Establish what resources can be requested to provide pumping out of floodwater	21487

TACTICAL ACTIONS

Incident commanders should:

Revised, new, archive or no change	Tactical action
Revised	Consider the effects of pumping out structures, including temporary or unstable structures
New	Request appropriate resources if pumping out of structures is required
New	Consider the impact of pumping out structures on biosecurity and the environment, including to undamaged or unaffected areas
New	Consider delaying pumping out structures until the floodwater has subsided

Control measure – Request National Resilience resources for high volume pumps: Floodwater

CONTROL MEASURE KNOWLEDGE

High volume pumps (HVPs) can be used for incidents including:

Natural flooding – Flooding is becoming an increasing problem; it may cause widespread damage and disruption to areas and can often affect a large number of locations at the same time. HVPs can enhance the ability of the fire and rescue service to mitigate the effects of flooding. This assistance may involve working in partnership with the lead government agency for flooding or the environmental agency.

Deliberate flooding – There are incidents where an individual or an organisation deliberately cause flooding. HVPs can enhance the capability of the fire and rescue service, to mitigate the effects of these incidents. This assistance may involve working alongside water or wastewater service suppliers and the environmental agency.

Operations to save life, prevent incident escalation or to render humanitarian services should not be delayed awaiting the attendance of HVP resources, subject to a risk assessment.

Requesting National Resilience response

If the fire and rescue service incident commander believes the National Resilience HVP capability is required, they should provide the following information to National Resilience Fire Control (NRFC) via the affected fire and rescue service control room:

- Intended use of the HVP – water provision or water removal
- Incident details, including size, type and scale

- Current pumping resources and capabilities in use
- Resource requirements
- Initial location for a rendezvous point (RVP), strategic holding area (SHA) or multi-agency strategic holding area (MASHA)
- Host fire and rescue service point of contact name and contact details
- Safe approach route to the incident
- Potential length of deployment

Early consideration should be given to requesting a tactical adviser for information and support regarding the capabilities and deployment of HVPs. This can be sought through the National HVP tactical adviser (TacAd) cadre, either remotely via telephone or by requesting them to attend the incident. Any request for a TacAd should be made to NRFC via the affected fire and rescue service control room.

HVP assets are mounted on prime movers and are classed as large goods vehicles. They weigh approximately 26 tonnes fully laden. This should be taken into account when determining suitable access and egress routes, and hard standing areas to demount units. Demounted units maybe be left in situ for several days; therefore the security of the assets should be considered.

If the deployment of a HVP will be into open water consideration should be given to the distance from a suitable hard-standing area for the HydroSub to the open water. HVPs have a submersible pump with hydraulic power hoses and winch cable of 60m, with the submersible pump capable of being deployed up to a distance of 55m from the HydroSub. A small number of HVPs have been modified with 80m of hydraulic power hoses and winch cable to enable the deployment of the submersible pump up to a distance of 75m from the HydroSub.

HVP delivery hose lines are 150mm in diameter when laid and charged and can cause obstructions to transport networks and premise access. Hose line routes should be carefully considered, in conjunction with the use of hose ramps. Three hose ramp sets are provided with each full HVP set.

Hosting a national response

The requesting fire and rescue service may need to provide support to the National Resilience resources, including the following activities:

- Establish the number of resources being provided and identify suitable locations for them, including pre-deployment and post-deployment locations, such as RVPs, SHAs or MASHAs
- Identify suitable routes for HVP vehicular access and demounting locations
- Consider routes for HVP hose deployment, the potential impact and mitigation options
- Identify suitable locations to clean, decontaminate and repatriate pumps and equipment if necessary
- Collate team data sheets on the arrival of HVP resources
- Record all HVP assets being deployed

- Establish communications protocols with HVP resources, including the issue of radios if not already held
- Establish and record agreed call signs for all HVP resources
- Nominate a site for each team at the RVPs, SHAs or MASHAs
- Request welfare facilities for HVP teams

STRATEGIC ACTIONS

Fire and rescue services should:

Revised, new, archive or no change	Strategic action	Reference No. if applicable
Revised	Have systems in place to request HVP resources, or specialist HVP capability advice, from National Resilience Fire Control	22782

TACTICAL ACTIONS

Incident commanders should:

Revised, new, archive or no change	Tactical action
Revised	Request HVP resources, or specialist HVP capability advice, using agreed National Resilience protocols
New	Establish appropriate rendezvous points (RVPs), strategic holding areas (SHAs) or multi-agency strategic holding areas (MASHAs)
New	Provide support to the National Resilience resources as required
No change	Consider the environmental impact of using HVP to remove floodwater

Control measure – National Resilience: Deployment of high volume pump resources

CONTROL MEASURE KNOWLEDGE

Due to the nature of use, a high volume pump (HVP) sector at an operational incident often provides a series of operational challenges for the capability. These include:

- An incident sector footprint which may span over several kilometres due to the distance that hose can be deployed, and water pumped
- The need for an adequate incident ground communications strategy, due to the potential

distance between HVP crews and the limitations of some fire and rescue service radio equipment

- A need to retain a focus on HVP crew welfare management; crews can often be operating a significant distance from the main scene of operations for protracted periods
- The need to effectively manage the demands of HVP sector logistics, including:
  - Fuel supplies
  - Reliefs and welfare
  - Equipment breakdown or maintenance support
  - Security
  - Lighting
  - Recovery planning, including decontamination and cleaning

For complex or protracted incidents and those requiring multiple assets further assistance may be provided through the request and mobilisation of enhanced logistical support (ELS).

HVP equipment should only be installed, set up or operated by personnel, trained and deemed competent in its use. When deploying HVP resources, there will be a minimum of five competent HVP operators. HVP operators should only be tasked for the deployment, use and recovery of HVP equipment and not for any other purpose during the incident. The following roles are usually included in the response:

Driver/hook arm operator – trained to drive the prime mover and operate the hook lift system to deploy the main HVP module, the HydroSub and hose box modules. They can operate elements of the HVP hose recovery system within the cab to retrieve hose and are also able to operate as a driver's assistant.

HVP operator – trained in all aspects of HVP operation, including procedures for deploying and recovering the HydroSub, deployment and retrieval of hose, operation of the HydroSub, winch cable, and the use of all ancillary equipment

Traffic marshal – trained to assist the driver with loading or unloading the HVP main module, and the loading process for the HydroSub or hose box modules. If trained to do so, they can also assist with hose deployment, hose retrieval and the operation of ancillary equipment.

Service specific support crew – trained in specific aspects of the operator's role to suit individual fire and rescue service requirements, such as hose recovery.

STRATEGIC ACTIONS

National Resilience should:

Revised, new, archive or no change	Strategic action	Reference No. if applicable

No change	Provide appropriate advice and/or resources, including equipment and personnel as requested, for the incident type and size	22794
No change	Carry out specialist HVP roles appropriate to the incident type and size	22795

TACTICAL ACTIONS

Specialist responders should:

Revised, new, archive or no change	Tactical action
No change	Establish adequate incident ground communications for HVP operators
No change	Manage high volume pump personnel welfare
No change	Manage the demands of HVP sector logistics

Control measure – National Resilience: High volume pump hose deployment

CONTROL MEASURE KNOWLEDGE

Consultation should take place between all relevant agencies over the proposed route of the hose deployment, with consideration given to traffic management and the impact on the surrounding community.

The hose route should take into account:

- Topography
- Terrain
- Infrastructure that may be affected
- Distance
- Position of hose lines (left, right or centre lay)
- Single, twin or multiple hose lines
- Weight of charged hose lines
- Traffic management requirements
- Drainage points
- Hose ramp points
- Discharge point
- Recovery of hose

Hose ramps should be used to protect hose lines if they are routed across vehicular access, including roads. Consideration should be given to the limited number of hose ramp sets on each HVP; there are three sets on each full HVP set. Additional hose ramps can be requested through National Resilience Fire Control (NRFC) via the affected FRS control room. Traffic calming measures and

marshalling should be put in place to reduce the risk of damage to the hose lines and the vehicles crossing them; early consideration should be given requesting the assistance of the police, local authority or highways agency to provide traffic management solutions. Hose ramp points will be suitably signed, coned and illuminated.

STRATEGIC ACTIONS

National Resilience should:

Revised, new, archive or no change	Strategic action	Reference No. if applicable
No change	Provide appropriate advice and HVP resources, including equipment and personnel as requested, for the incident type and size	22799

TACTICAL ACTIONS

Specialist responders should:

Revised, new, archive or no change	Tactical action
No change	Provide technical information and advice to inform the decision for hose deployment
No change	Deploy HVP hose lines following agreed routes
No change	Ensure that hose lines are obvious to traffic and are protected by hose ramps, traffic calming measures and marshalling where required

Control measure – National Resilience: Deploy high volume pumps to remove floodwater

CONTROL MEASURE KNOWLEDGE

If there is large-scale flooding, pumping operations may need to be provided for extended durations which may extend to multiple weeks.

The suitability of the receiving area for the extracted floodwater will need to be assessed prior to operations. Considerations should include the environmental impact and the surrounding communities. For example, the receiving area should not be:

- Environmentally sensitive
- A Site of Special Scientific Interest (SSSI)
- Susceptible to further flooding

Floodwater may be contaminated with chemicals or sewage; advice should be sought from the environmental agency or hazardous materials advisor. A suitable location should be identified to carry out decontamination of equipment. A HVP Tac Ad will be able to assist with the consideration and identification of an appropriate site. Consideration should also be given to biosecurity.

Further information about the use of an HVP submersible pump can be found in the control measure for Fires and firefighting - National Resilience water delivery: Deploy high volume pumps into open water. Additional consideration should be given to the likelihood of the presence of contaminants and debris.

STRATEGIC ACTIONS

National Resilience should:

Revised, new, archive or no change	Strategic action	Reference No. if applicable
No change	Provide appropriate advice and resources for water extraction, including equipment and personnel as requested, for the incident type and size	22814

TACTICAL ACTIONS

Specialist responders should:

Revised, new, archive or no change	Tactical action
No change	Consider appropriate locations to deploy HVPs
No change	Consider the environmental impact of delivering floodwater to another area
No change	Ensure the floodwater is of a minimum depth to ensure safe submersible pump operation
No change	Place HVP equipment in a safe area that has been made as safe as practicable
No change	Adopt appropriate protocols for working on or near water when deploying or retrieving the submersible pump
No change	Monitor the function of the submersible pump during operations
No change	Carry out appropriate decontamination of equipment

Hazard – Utilities: Flooding

HAZARD KNOWLEDGE

Water in buildings can compromise the safety of gas and electric supplies to both the building and appliances in the building, causing an increase in fire risk.

Electricity in buildings

Water is an excellent conductor of electricity, therefore there is a significant risk of electrocution if water has entered buildings. This may be caused by:

- Touching or operating electrical installations or appliances while standing in water
- Electrical installations or appliances being submerged in water, causing electrification of the water
- Damaged electrical installations or appliances, causing electrification of the water
-

High-voltage electricity systems

Transmission system substations or overhead lines operate at significantly higher voltages (400kV or 275kV) than local distribution networks. Emergency services should keep away from transmission and distribution system substations and downed overhead line conductors that are affected by flooding until they receive notification from the owner or operator of the transmission system. In flood conditions it should be assumed that all high voltage equipment remains live.

For more information refer to Utilities and fuel – Electricity.

Most equipment in substations is designed to be unaffected by a degree of flooding, although there will be a safe operating flood-level limit. If water reaches this level, the network operator may have to switch off electricity supplies for safety reasons and to prevent damage to the equipment.

Personnel should assume that all equipment in substations presents a hazard, unless the distribution network operator or transmission operator confirms that it has been isolated. The environment around a flooded substation may contain hazards, such as hidden trenches.

Battery storage facilities

The presence of any renewable energy systems, such as turbines or photovoltaic (PV) systems, may indicate that the building or facility also has battery storage facilities.

For a building, battery storage could be located anywhere inside or outside; for a residential building, the garage is a common location. Although the installer should site the battery storage so that it cannot be affect by flooding, it should not be assumed that this advice has been followed or, if it has, that the flood has remained within predicted levels.

For a larger site, such as a solar farm, the location of the battery storage should have undergone a flood risk assessment at the planning stage. In an area that is subject to flooding, the battery storage

may be housed in a structure that is raised from the ground. Similarly, it should not be assumed that a flood risk assessment was carried out, that advice from the assessment was followed or that the flood has remained within predicted levels.

Flooding of lithium-ion battery storage facilities may result in the risk of thermal runaway, which could result in fire and the release of flammable and toxic gases and vapours. If this were to occur in an enclosed space, such as a garage, there would be an increased risk of an explosive atmosphere rapidly developing.

Generators

Most infrastructure has some dependence on electrical supply and although back-up systems may be available, this may also be affected by floodwaters. For example, many hospital back-up generators are in basements that can be affected by flooding.

Gas and fuel oil

Gas appliances, such as boilers, may be unsafe to use if they or their vents or flues have been affected by floodwater. Floodwaters can cause liquefied petroleum gas (LPG) or fuel oil bulk storage vessels and gas cylinders to move or detach from installation pipework.

Utility pipelines

Pipelines carrying gas, oil, water or sewage may be damaged by floodwaters. For more information refer to Utilities and fuel – Pipeline failure.

Control measure – Isolate or make safe utilities: Flooding

CONTROL MEASURE KNOWLEDGE

Isolating or making safe utilities during a flood will potentially be more hazardous or difficult to achieve. There should be emphasis placed on liaising with the utility provider to obtain advice or assistance if required. It may be beneficial to establish memoranda of understanding (MoUs) with utility or fuel supply companies to improve joint working at a flood.

If the hazards from the presence of utilities in a flood cannot be controlled, fire and rescue services should:

- Establish and maintain appropriate cordons to protect members of the public, personnel and other emergency responders from the utilities that may be affected by floodwater
- Consider adopting defensive tactics

Electric and gas supplies

Control measures for dealing with electric and gas supplies are provided in the Utilities and fuel guidance, including:

- Situational awareness: Utilities and fuel
- Seek specialist advice or assistance for dealing with utilities or fuel

- Apply cordons and control for utilities or fuel
- Isolate utility or fuel supply to the premises
- Isolate utility or fuel supply within the national grid

Renewable energy

Control measures for dealing with renewable energy are provided in the Utilities and fuel guidance, including:

- Isolate photovoltaic (PV) systems
- Identify presence and type of rechargeable batteries
- Isolate rechargeable batteries
- Safe system of work: Rechargeable batteries
- Isolate the turbine

Pumping out of any commercial renewable energy site that has battery storage facilities should be co-ordinated and controlled by the responsible person.

Electricity

Control measures for dealing with electricity are provided in the Utilities and fuel guidance, including:

- Safe system of work: Low-voltage electricity
- Personal protective equipment: Electrical gloves
- Safe system of work: High-voltage electricity
- Contact distribution network operator or transmission operator
- Adopt defensive tactics until the utility system is isolated

Pumping out of any electrical substations or high-voltage power equipment should be co-ordinated and controlled by the responsible person.

Utility pipelines

Isolating pipelines will require specialist assistance and may take some time to achieve. For more information refer to Utilities and fuel – Isolate pipelines.

Some utility pipelines, such as sewers, contain hazardous materials. In the event of such pipelines failing, appropriate hazardous materials protocols should be applied.

STRATEGIC ACTIONS

Fire and rescue services should:

Revised, new, archive or no change	Strategic action	Reference No. if applicable
Revised	Maintain a directory of emergency contact details for local utility and fuel supply companies	13592
New	Consider establishing memoranda of understanding (MoUs) with local utility and fuel supply companies to improve joint working at a flood	

TACTICAL ACTIONS

Incident commanders should:

Revised, new, archive or no change	Tactical action
New	Establish and maintain appropriate cordons to protect people from the utilities that may be affected by floodwater
New	Consider adopting defensive tactics if utilities cannot be isolated or made safe at a flood
New	Consider using appropriate techniques to isolate or make safe utilities at a flood
New	Seek specialist advice or assistance from the appropriate organisations for dealing with utilities at a flood

Hazard – Unstable ground or surfaces

HAZARD KNOWLEDGE

Unstable ground or surfaces can be hazardous as they may give way when downward pressure is applied. The ground or surface may be soft enough to allow people to sink, until movement becomes impossible. The ground or surface might have a layer of relatively firm ground covering softer material, but this may break through if sufficient pressure is applied.

Attempting to work on unstable ground or surfaces without the appropriate training, skills and equipment may result in serious injury to personnel.

Fire and rescue service vehicles may become trapped or stranded on unstable ground or surfaces. On sites that do not have designated hard standing or purpose-made vehicle routes, ground conditions can quickly deteriorate. For more information refer to Operations – Driving to incidents.

This hazard covers unstable ground or surfaces that could give way, break, collapse or allow people, equipment or vehicles to sink into or become stuck in. This includes:

- Ice
- Mud
- Steep slopes
- Embankments
- Gravel
- Sand
- Slurry
- Rubble or debris, for example following a structural collapse
- Free-flowing solids, such as soil, sugar, grain or rice; if these are present in a confined space, also refer to Height, structures and confined space – Confined space environment

Other related guidance includes:

- Height, structures and confined spaces – Fragile surfaces, such as roofs and structural elements
- Height, structures and confined spaces – Unstable or collapsed natural or built environments, such as trenches, excavations and pits
- Height, structures and confined spaces – Unstable or collapsed structures, such as the geological causes of instability or collapse
- Industry – Stacked materials, such as manufactured or waste materials, including landfill sites

If the incident on unstable ground or surfaces involves a casualty, refer to Search, rescue and casualty care – Casualty on unstable ground. If the incident on unstable ground involves an animal,

refer to Incidents involving animals - Animal in water, on ice, or on unstable ground.

Ground or surfaces may become unstable due to:

- The effects of the incident, for example peat or waste burning away under the surface
- The introduction of water to the ground; this could be from:
  - Operational activity, for example the application of large volumes of water to a soluble or semi-soluble substance, such as when carrying out a mud rescue
  - Flooding
  - Adverse weather
- Thawing of an area where the ground or surface has been frozen
- Geological activity, for example erosion that has undermined the integrity of the ground
- Vibration from on-site machinery or on-site vehicles
- Severe impact
- Heavy loads close to an edge
- Partial or full structural collapse

There is frequently little or no indication of the transition between stable and unstable ground or surfaces. If there is evidence of structural collapse, this may indicate that the surrounding ground is unstable.

The following hazards and their associated control measures may also apply when working near unstable ground or surfaces:

- Operations – Working near water or other liquids
- Height, structures and confined spaces – Unguarded edges

Ice

Ice should never be considered safe to walk on. The thickness may vary depending on water depth, temperature and microclimates. It can be difficult to determine the depth and flow of water underneath the ice. People can fall through ice and travel a significant distance below the surface or become trapped beneath it, thereby requiring rescue from water.

Mud

It may be difficult to access the scene of operations through deep mud, as walking may become impossible without specialist equipment, such as mud shoes. The distance to the scene of operations can make the situation more difficult, as can working in reduced visibility. The mud may also be subject to tidal changes and quickly become submerged.

Geological movement

Unstable ground or surfaces may be due to geological movement. The cause may not be known and could be minor, but the history of the area may indicate a need to be aware of potential or further

ground movement. For example, in areas of known mining, the geological movement may be caused by the collapse of old workings.

Control measure – Safe system of work: Unstable ground or surfaces

CONTROL MEASURE KNOWLEDGE

Accessing unstable ground or surfaces

If accessing unstable ground or surfaces, including mud flats, the provision of rescue paths for access and egress need to be carefully planned and implemented. A safe system of work that is capable of recovering emergency responders, and casualties if present, should be put in place. An example of this is a recoverable system using rope equipment, but that may not be appropriate in all circumstances.

Personnel should avoid walking on unstable ground or surfaces. If this is not possible, specialist equipment should be used to mitigate the risk of collapse. The use of inflatable rescue paths and other types of platform may spread the weight and provide a stable platform to work from. Inflatable rescue paths and sleds are buoyant and may reduce the risk of immersion when working on an unstable surface, such as ice on a body of water.

Buoyancy aids should be used if there is a risk of submersion in water. However, the rescue of people wearing automatically inflated buoyancy aids via a hole in the ice will be difficult and hazardous.

When working on or near mud in tidal areas, the use of suitable rescue craft should be considered. Tide charts or timetables should form part of the decision making, especially if the area is subject to rapid submersion. For more information refer to Water rescue - Check water and tidal conditions.

When transporting equipment consider towing or using backpacks or bags to allow the use of hands whilst moving and reduce the risk of losing dropped equipment.

Working on unstable ground or surfaces

Personnel should be aware of the physical condition of the ground or surfaces they are working on. They may be steep, slippery or have loose surface materials and be more unstable than they appear to be.

When working on unstable ground or surfaces, the area should be monitored continually to spot any movement or dipping; this may indicate subsidence and possible collapse into unidentified voids. If the ground or surface is frozen, the area should be monitored continually for signs of thawing that could impact on stability.

If a flow of water could worsen ground conditions, consideration should be given to:

- Channelling water to sacrificial areas
- Containing, diverting or controlling the use of fire water to reduce the impact on ground conditions; for more information refer to Environmental protection – Fire water run-off.

Working on or moving vehicles on unstable ground or surfaces should be avoided and care should be taken whenever vehicles are driven off-road. An assessment should be made to ensure that the surface can take the weight of the vehicle, avoiding the possibility of it becoming stranded. For more information refer to Operations - Position fire and rescue service vehicles safely.

At some locations there may be on-site machinery or vehicles that are suitable for use on unstable ground or surfaces. For more information refer to:

- Industry - Use competent people to operate on-site machinery
- Industry - Use competent people to operate on-site vehicles

Careful siting of equipment or vehicles, including aerial appliances, will be required and ground conditions should be constantly monitored. The equipment or vehicles may have to be relocated if the ground they are on becomes unstable.

STRATEGIC ACTIONS

Fire and rescue services should:

Revised, new, archive or no change	Strategic action	Reference No. if applicable
Revised	Have access to equipment and vehicles appropriate for working on unstable ground or surfaces in their area	21501
Archive	~~Identify areas where unstable ground may be present and make this information available to personnel~~	~~21490~~

TACTICAL ACTIONS

Incident commanders should:

Revised, new, archive or no change	Tactical action
Revised	Establish rescue paths for access and egress to unstable ground or surfaces; this may require the use of inflatable rescue paths
	Monitor ground and surface conditions for any changes in their stability
	Consider controlling the flow of water, including fire water, that may worsen the stability of the ground or surface
	Consider the use of on-site machinery or vehicles to access sites with unstable ground or surfaces
New	Monitor the ground conditions around equipment or vehicles in use at incidents involving unstable ground or surfaces
New	Be prepared to relocate equipment or vehicles in use at incidents involving unstable ground or surfaces if the ground they are on becomes unstable

Control measure – Specialist resources: Unstable ground or surfaces

This control measure should be read in conjunction with Incident command – Specialist resources

CONTROL MEASURE KNOWLEDGE

Unstable ground or surfaces can present challenges to personnel and may require specialist resources or equipment to effectively resolve the incident.

Incidents involving unstable ground or surfaces may require actions that are beyond the capabilities of the initial response. Personnel should be aware of the restrictions that available equipment and training place on their ability to take action. If it is not possible to put sufficient control measures in place to safely and effectively deal with the incident, specialist resources, such as technical rescue teams, should be requested.

Technical rescue teams may be able to provide:

- Support in creating safe working platforms
- Assistance with shoring
- Specialist equipment
- Alternative means of access

If the ground or surface instability could be due to geological movement, specialist resources may be able to provide monitoring equipment and advice. For more information refer to Height, structures and confined spaces – Use of structural monitoring.

Watercraft such as rescue sleds, boats and rescue platforms may be appropriate to provide a safe means of access. This specialist equipment will need to be operated by personnel with the appropriate training and skills, or by specialist resources.

The Maritime and Coastguard Agency (MCA) and voluntary organisations can provide details of specialist mud rescue services in coastal areas. MCA rescue teams and some local voluntary rescue associations, including the Royal National Lifeboat Institution (RNLI), may have considerable knowledge of the area and the capability to operate on local mud flats.

Aerial appliances may be able to provide a safe working platform to access unstable ground or surfaces, although their use may cause additional hazards due to their weight, movement or vibration.

If there are locations in the fire and rescue service area that are subject to having unstable ground or surfaces, it may be beneficial to participate in on-site joint training and exercises. This will help to improve interoperability by gaining an understanding of the capabilities of external agencies when dealing with incidents at such locations.

STRATEGIC ACTIONS

Fire and rescue services should:

Revised, new, archive or no change	Strategic action	Reference No. if applicable
Revised	Maintain a directory of emergency contact details for specialist resources that can assist at incidents involving unstable ground or surfaces	21491
New	Participate in joint training and exercises with other agencies to improve interoperability at incidents involving unstable ground or surfaces	

1520 *TACTICAL ACTIONS*

1521 Incident commanders should:

Revised, new, archive or no change	Tactical action
Revised	Request appropriate specialist resources for incidents involving unstable ground or surfaces
Revised	Consider the use of specialist equipment at incidents involving unstable ground or surfaces

1522

Hazard – Landslides and coastal cliff collapse

HAZARD KNOWLEDGE

Landslides and coastal cliff collapse can present challenges to personnel and may require specialist equipment or personnel to effectively resolve the incident. Attempting a rescue from or working at a landslide or coastal cliff collapse without appropriate or specialist resources and equipment may result in serious injury to emergency responders.

Landslides and coast cliff collapse can result in:

- Damage to or loss of land
- Damage to or loss of buildings, vehicles or infrastructure
- Injury to people or animals

If buildings or infrastructure are affected by a landslide or cliff collapse, it may result in environmental hazards such as:

- Damage to utilities or utility pipelines
- Ruptured oil or septic tanks

For more information refer to:

- Environmental protection – Polluting materials
- Utilities and fuel
- Hazardous materials – Environmental harm

If there is a landslide or coastal cliff collapse, the suddenness of the event and potential outcomes may result in fire and rescue services attending to assist with:

- Establishing cordons
- Rescuing casualties
- Stabilising buildings, structures or modes of transport
- Isolating utilities

As landslides can occur on coastlines as well as inland, it may not be possible to determine, without specialist advice, whether a coastal event is a landslide or a coastal cliff collapse. However, the primary and secondary hazards, and the control measures to mitigate them, are also very similar.

Landslides

Landslides can happen suddenly or more slowly over long periods of time. Heavy rainfall, flooding, weathering of the ground, traffic vibration or earthquakes are some of the causes of landslides. Landslides are classified by their type of movement, with the four main types being:

- Falls

- Topples
- Slides
- Flows

There may be one or more types of movement in a single event.

Flows are landslides that involve the movement of material down a slope in the form of a fluid. They often result in an upside-down funnel shaped deposit when the material has stopped moving. There are different types of flows including:

- Mud flows, which are often associated with larger complex landslides
- Debris flows, which can be very rapid and usually occur on steep slopes
- Rock flows, which are also known as avalanches

Landslides can be powerful enough to move vehicles, trees and buildings in their flow. They can be over 20m wide and move at up to 35mph, making them difficult to outrun or outmanoeuvre.

Secondary hazards of landslides include:

- Damage to utilities or utility pipelines, which can result in fire or gas leaks
- Damage or blockage of roads, which may affect the response to an incident
- Building collapse
- Blockages to bodies of water, which could result in flooding
- Unstable ground or surfaces

Coastal cliff collapse

A Coastal Change Management Area is an area identified in local plans as likely to be affected by physical changes to the shoreline through erosion, landslip, permanent inundation or accumulation of sediment. Information on Coastal Change Management Areas is available in GOV.UK guidance on Flood risk and coastal change.

Fire and rescue services should consider seeking advice from coastal engineers and environmental agencies to maintain an understanding of the current situation and risks in their area.

The coastline, especially areas of soft rock, are at risk of coastal erosion, cliff instability and cliff collapse. Any interaction with an unstable cliff may cause a partial or total collapse. The hazards are very similar to those relating to landslides, as this may result in falling and sliding rocks that present a hazard to emergency responders or other people, including casualties. The falling and sliding rocks may create a further collapse and more damage or loss to buildings or infrastructure.

There are factors that may activate an initial or secondary cliff collapse, such as:

- Heavy rainfall
- Heavy snowfall, resulting in high amounts of run-off

- Landslides
- Storms or high sea swell

Control measure – Safe system of work: Landslides and coastal cliff collapse

CONTROL MEASURE KNOWLEDGE

Cordons and access

Cordons around the hazard area should be immediately established, to keep members of the public and emergency responders at a safe distance from the landslide or coastal cliff collapse. For more information refer to Incident command – Cordon controls.

The police may need to carry out road closures and prevent members of the public entering the hazard area; these types of incident often draw onlookers.

If possible and safe to do so, it may be beneficial to move vehicles or other property away from the hazard area, especially if this may prevent them from falling into the area affected by the landslide or coastal cliff collapse.

Approaching a landslide or coastal cliff collapse

During approach and deployment at an incident involving a landslide or coast cliff collapse, the effects of vibration and movements should be considered and monitored. Movements of vehicles, personnel and other emergency responders, and the use of machinery or equipment, should be minimised.

Exclusion zones should be set up and avoidance routes identified. Personnel and other emergency responders should be briefed about avoidance routes and exclusion zones and provided with updates if they need to be changed.

Safe access and egress routes should be established and monitored; if there are any safety concerns with these routes, alternative routes should be identified or tactical plans revised.

Direction of approach to a landslide

Landslides will usually travel in the direction of a slope, but this can include lateral movement and initial movement may be slow or difficult to perceive. Approach should be from an uphill position and areas deemed as unsafe should be identified and marked. This type of incident may benefit from the deployment of safety officers, who can visually monitor the landslide area for further flows of material or other ground movement.

Direction of approach to a coastal cliff collapse

When approaching incidents from a clifftop or base of a cliff, consideration should be given to its stability before personnel are deployed to the hazard area. This type of incident may benefit from the deployment of safety officers, potentially located at the top and base of the cliff, who can visually monitor the area for signs of further collapse.

Situational awareness

Personnel should consider the stability of the landslide or cliff collapse area when operating on or near it. When attending an initial collapse, personnel should be aware of the possibility of a secondary collapse occurring; this may be as a result of the disturbance from the initial collapse or other factors. The extent of a secondary collapse will be unknown and may include large areas of land that emergency responders and members of the public may believe to be safe.

Situational awareness can be gained from:

- Above the landslide or at the clifftop; signs of instability include:
  - Cracks in the ground
  - Appearance of sinkholes
- The base of the landslide or cliff, if assessed to be safe and feasible; signs of instability include:
  - Activity of recent landslide or movement of material
  - Cracking
  - Seeping water from a cliff face

The risk of secondary hazards or further movement or collapse should be considered. Buildings, structures and infrastructure in the area should be assessed for the risk of collapse.

Situational awareness may also benefit from the deployment of drones (classified as a type of unmanned aircraft by the Civil Aviation Authority); they may be able to provide a downlink to assist with an assessment of the stability of the landslide area or cliff.

Evacuation

If there are people in buildings, structures or other areas that may be affected by a landslide or coastal cliff collapse, their evacuation should be a priority. The police should be requested to assist and lead with this activity if time permits. For more information refer to Operations – Evacuation and shelter.

Evacuation and access routes should consider the effects of secondary hazards and affected areas should be avoided by members of the public, personnel and other emergency responders if possible. Fire control room and on-scene personnel should exchange information about evacuation needs and the evacuation routes that should be used if required.

Rescue from a landslide or coastal cliff collapse

There could be casualties involved in the landslide or coastal cliff collapse, who for example:

- Are trapped in a building – for more information refer to Search, rescue and casualty care – Accessing a casualty
- Are trapped in an unstable mode of transport – for more information refer to Search, rescue and casualty care - Accessing a casualty involved with an unstable mode of transport

If a landslide or coastal cliff collapse results in needing to rescue a casualty, consideration should be given to:

- Secondary hazards and further flows or collapse of materials
- Impacts from operational activity on ground stability

The rescue should include appropriate distribution of weight to unstable ground and the use of ground anchors for the safety of personnel and the casualty.

If there are people trapped in a partially or fully collapsed building following a landslide or coastal cliff collapse, an appropriate risk assessment should be carried out before any attempt to perform a rescue. Specialist advice from a geophysical engineer should inform the tactical plan. For more information refer to Search, rescue and casualty care - Primary search: Unstable or collapsed structure.

For more information about rescuing a casualty who has fallen with or into materials, such as mud, debris or rocks, refer to Search, rescue and casualty care – Rescue a casualty at height. If a risk assessment determines that the ground is too unstable to lower and raise an emergency responder, other options should be considered. This could include:

- Lowering an emergency responder to the casualty, then lowering both people to the ground below
- Requesting specialist resources

STRATEGIC ACTIONS

Fire and rescue services should:

Revised, new, archive or no change	Strategic action	Reference No. if applicable
Archive	~~Establish multi-agency working protocols for geological hazards~~	21509
New	Consider providing local equipment or access to specialist resources to enable personnel to work safely in the area around landslides and coastal cliff collapse	

TACTICAL ACTIONS

Incident commanders should:

Revised, new, archive or no change	Tactical action
Revised	Establish and monitor safe approaches to and cordons for a landslide or coastal cliff collapse
Revised	Consider minimising the movement and use of equipment and vehicles near the area affected by a landslide or coastal cliff collapse
Revised	Consider appointing safety officers to visually monitor the area for material or ground movement following a landslide or coastal cliff collapse

New	Consider evacuating buildings, structures or other areas that may be affected by a landslide or coastal cliff collapse
New	Consider requesting drones to provide a downlink to assess the stability of the landslide or coastal cliff collapse or to locate casualties involved in the event
New	Exchange information with the fire control room about evacuation needs and the evacuation routes that should be used if required following a landslide or coastal cliff collapse

Fire control personnel should:

Revised, new, archive or no change	Tactical action
New	Liaise with on-scene personnel about evacuation needs and the evacuation routes that should be used if required following a landslide or coastal cliff collapse

Control measure – Specialist resources: Landslides and coastal cliff collapse [NEW]

This control measure should be read in conjunction with Incident command - Specialist resources

CONTROL MEASURE KNOWLEDGE

An early request for a civil, geotechnical or coastal engineer to provide advice and assistance should be considered. These specialist resources are able to investigate the strength and integrity of the area affected by the landslide or cliff collapse, as well as determine the likelihood of further movement or collapse. This information will help fire and rescue services, and other involved agencies, to jointly form a tactical plan, which should include appropriate cordons and the need for further evacuations.

If the landslide or cliff collapse has affected the built environment, isolation of utilities may be required. When requesting support from utility companies, they should be informed about the extent of damage; as they may need to carry out isolation remotely or further away from the scene of the incident.

It may be beneficial to request specialist resources to provide advice and assistance through the use of monitoring equipment. For more information refer to Height, structures and confined spaces – Use of structural monitoring equipment.

The appropriate environmental agency should be notified about the landslide or cliff collapse, because of the potential for environmental contamination. If required, an appropriate environmental risk assessment should be completed. For more information refer to Environmental protection – Environmental risk assessment.

If casualties have been buried by debris from a landslide or coastal cliff collapse, specialist resources, such as urban search and rescue (USAR) may be required. The equipment and resources that are available from USAR may benefit the incident outcome, especially if an early request is made. For more information refer to Search, rescue and casualty care - Request National Resilience resources: Urban search and rescue.

Searches for casualties may benefit from the deployment of drones (classified as a type of unmanned aircraft by the Civil Aviation Authority). For more information refer to Search, rescue and casualty care - Aerial resources: Drones for search.

If a rescue is required following a landslide or coastal cliff collapse, resources that mitigate the deployment of personnel or disturbing unstable material should be considered. This could include the use of a helicopter with winch capability, or if it is a coastal event, a vessel to gain access from the sea. For more information refer to Search, rescue and casualty care - Aerial resources: Helicopters for search and rescue.

Joint training and exercises should help to improve interoperability by gaining an understanding of the capabilities of external agencies when dealing with a landslide or coastal cliff collapse.

STRATEGIC ACTIONS

Fire and rescue services should:

Revised, new, archive or no change	Strategic action	Reference No. if applicable
New	Maintain a register of engineers who can provide advice or assistance for landslide or coastal cliff collapse incidents	
New	Participate in joint training and exercises with other agencies to improve interoperability at landslide or coastal cliff collapse incidents	

TACTICAL ACTIONS

Incident commanders should:

Revised, new, archive or no change	Tactical action
New	Request the attendance of USAR if a casualty is buried under debris from a landslide or coastal cliff collapse
New	Consider requesting the attendance of a civil, geotechnical or coastal engineer following a landslide or coastal cliff collapse
New	Request the attendance of utility companies if required following a landslide or coastal cliff collapse
New	Ensure the stability and integrity of the area affected by a landslide or coastal cliff collapse informs the tactical plan
New	Notify the environmental agency about the landslide or coastal cliff collapse so that they can consider the environmental impact
New	Consider requesting helicopters or vessels with rescue capability following a landslide or coastal cliff collapse
Revised	Consider requesting geological monitoring equipment in consultation with USAR tactical advisers or other specialists

Hazard – Sinkholes [NEW]

HAZARD KNOWLEDGE

There are several different types of sinkhole, which are sometimes called dolines:

- Solution sinkholes

  These are formed by local chemical weathering of the limestone where water accumulates around a fissure or joint in the rock. This may be underneath the soil or on the ground surface. The hollow that is formed is drained of water through the fissure or joint, but not before it has dissolved some of the limestone. The depression gradually gets enlarged.

- Collapse sinkholes

  These occur where the gradual collapse of a cave passage occurs and eventually causes subsidence at the surface level.

- Suffosion sinkholes

  These form where solution of the limestone has created a depression on the surface of the limestone, but under a covering of soil. The unsupported soil subsides into the cavity and leaves a depression in the landscape. These are sometimes referred to as subsidence sinkholes.

- Drop out sinkholes

  These can be more suddenly created if the surface material is more solid, like clay, as a large cavity could have been created below the surface and can suddenly collapse without warning.

A sinkhole may be tens or more of meters deep, and it will eventually lead into a cavity which may extend downwards for hundreds of meters below the ground. These can collapse downwards due to gravity, leading to great surface depressions and subsidence damage and even the complete loss of houses.

Sometimes sinkholes are a purely natural phenomenon, but they may also be associated with previous industrial activities, most commonly mining. Historic mine workings in coal, salt, potash, tin and copper often leave voids in the ground. These voids may eventually come to the surface over time as the roof progressively collapses. These collapses can be gradual, or can happen suddenly, with surface depressions appearing without warning. Such rapid events are often associated with changes in groundwater or during excessive rainfall events.

Fire and rescue services should include this risk when carrying out risk management planning. If required, they should seek advice from environmental engineers and environmental agencies to understand the current situation and risks in their area.

The British Geological Society provides information about sinkholes, their appearance, type and location in the UK.

Sinkholes can result in:

- Damage and loss of land
- Damage to and loss of property and infrastructure
- Physical injury to people or animals

Control measure – Safe system of work: Sinkholes [NEW]

This control measure should be read in conjunction with Height, structures and confined spaces - Safe system of work: Unstable or collapsed natural or built environments

CONTROL MEASURE KNOWLEDGE

The suddenness of sinkhole events and potential outcomes may result in the attendance of fire and rescue services to assist with:

- Establishing cordons
- Rescue of casualties
- Stabilising buildings and infrastructure
- Isolating utilities
- Controlling transport networks

Establishing cordons

Cordons around the hazard area should be immediately established, to keep members of the public and emergency responders at a safe distance from the sinkhole. For more information refer to Incident command – Cordon controls.

It may be beneficial to appoint safety officers to visually monitor the area for changes in the sinkhole.

The police may need to carry out road closures and prevent members of the public entering the hazard area; this type of incident often draws onlookers.

If possible and safe to do so, it may be beneficial to move vehicles or other property away from the hazard area, especially if this may prevent them from falling down the sinkhole.

Evacuation

If there are people in buildings, structures or other areas that may be affected by a sinkhole are occupied, their evacuation should be a priority. The police should be requested to assist and lead with this activity if time permits. For more information refer to Operations – Evacuation and shelter.

Rescue of casualties

There could be casualties involved in the sinkhole event, who for example:

- Have fallen into the sinkhole or are stranded on land near to the sinkhole – for more information refer to Search, rescue and casualty care – Rescue a casualty at height

- Are trapped in a building – for more information refer to Search, rescue and casualty care – Accessing a casualty
- Are trapped in an unstable mode of transport – for more information refer to Search, rescue and casualty care - Accessing a casualty involved with an unstable mode of transport

Stabilising buildings and infrastructure

The local council should be contacted as they should be able to provide details of structural engineers who can provide advice and assistance. The council may also be able to provide information about any previous sinkhole events in the area, which will help to inform situational awareness.

Isolating utilities

The appropriate utility or fuel supplier should be asked to isolate the supply if it may be impacted by the sinkhole. This may need to be an emergency request if pipes are visibly affected. For more information refer to Utilities and fuel - Isolate utility or fuel supply within the national grid.

Controlling transport networks

If the communications or transport infrastructure may be impacted by the sinkhole, the appropriate organisation should be contacted, such as the highways agency, rail operator or communications network. For more information refer to Transport – Effective communication at transport incidents.

Joint training and exercises

Joint training and exercises should help to:

- Gain an understanding of the capabilities of external agencies when dealing with a sinkhole
- Establish roles and responsibilities when rescuing people from a sinkhole or from impacted buildings or modes of transport

STRATEGIC ACTIONS

Fire and rescue services should:

Revised, new, archive or no change	Strategic action	Reference No. if applicable
New	Consider providing local equipment or access to specialist resources to enable personnel to work safely in the area around sinkholes	

TACTICAL ACTIONS

Incident commanders should:

Revised, new, archive or no change	Tactical action

New	Establish and monitor safe approaches to and cordons for a sinkhole
New	Consider moving vehicles or other property away from the hazard area to prevent them falling into the sinkhole
New	Consider appointing safety officers to visually monitor the area for changes in the sinkhole
New	Consider evacuating buildings, structures or other areas that may be affected by a sinkhole
New	Contact the local council to request advice or assistance of structural engineers regarding sinkholes

1814

Hazard – Severe weather [NEW]

This should be read in conjunction with Operations - Weather conditions

HAZARD KNOWLEDGE

The UK weather system is mainly dictated by westerly winds that bring low pressure weather systems that often lead to unsettled weather conditions, particularly in winter.

Climate change has already altered the risk of certain types of extreme weather and further changes are expected in the future. Extreme heat has become more likely, while the risk of extreme cold has decreased. There is a trend toward wetter winters and drier summers, leading to an increasingly complex and challenging picture.

The National Risk Register assesses the risk from four main types of severe weather:

- Storms, gales, including hurricanes and tornados with damaging wind speeds and possible lightning
- Low (sub-zero) temperatures and heavy snow for prolonged periods
- Heatwaves with high temperatures lasting several weeks, harming peoples' health
- Drought as a result of a lack of rainfall over several years, leading to water shortages

Consequences of severe weather may include:

- Fatalities and casualties, affected physically or psychologically, particularly among vulnerable groups, such as older adults
- Evacuation and shelter of residents or employees of homes and businesses
- Widespread damage to property and infrastructure
- Disruption to essential services, particularly transport, utilities and communications
- Additional pressure on healthcare services
- Environmental damage

Fire and rescue service operational response can be hampered by severe weather, such as:

- Employees being unable to get to work
- Fire and rescue service vehicles being unable to negotiate road conditions
- Fire and rescue service premises being inaccessible or damaged
- Firefighting water supplies hampered, for example as a result of:
    - Insufficient hydrant pressure due to the supplier reducing flow in low temperatures
    - Bodies of water being extremely low due to drought
- Fire and rescue service equipment and vehicle malfunctions, due to exposure to extreme temperatures, for example:

- Equipment failing to charge
- Defibrillator pads losing adhesion
- Effects on vehicle components or fluids

Control measure – Safe system of work: Severe weather [NEW]

This control measure should be read in conjunction with Operations - Assess current and forecast weather conditions

CONTROL MEASURE KNOWLEDGE

Fire and rescue services should monitor forecasts for severe weather conditions that may affect their community and their operational response to that community. The impacts of severe weather can range from short-term to longer-term, which will affect the mitigation a service may need to apply.

Mitigation for impacts on the community

A fire and rescue service may need to support the community during severe weather. This could include assistance with:

- Operations -Evacuation and shelter
- Major incidents - Planning reception centres
- Operations -Emergency response plans
- Operations -Warning, informing and advising people

Business continuity for the fire and rescue service

Although written with a focus on flood events, the control measure Business continuity plans for the fire and rescue service: Flooding incorporates many of the issues that are presented in severe weather. This includes:

- How the health and safety of fire and rescue service employees will be monitored and maintained, especially if essential utilities may be compromised
- Whether fire and rescue service assets and resources need to be relocated, in order to protect them and maintain an adequate response
- Potential interdependencies, such as loss of electricity and resulting effect on mobilisation systems
- The potential impact on communications, including mobilisation systems and the contingency arrangements required to establish and maintain an operational response
- Consideration as to whether back-up power systems may be affected, such as standby generators or uninterruptible power supplies

The inability to access resources, provision of food and clean water, delays in responding and the effects on the lives of responders outside of their employment should be considered during planning

for severe weather, particularly for an extended out-of-area response.

Mitigation for impacts on water supplies for firefighting

Mitigation should be put in place if water supplies for firefighting may be impacted by severe weather, such as extreme cold or drought. For more information refer to Fires and firefighting – Water and extinguishing media management and planning.

Mitigation for impacts on fire and rescue service equipment and vehicles

Mitigation should be put in place to protect fire and rescue service equipment and vehicles from the impacts of extreme temperatures. This may be achieved by ensuring equipment and vehicles are stored under cover where possible.

STRATEGIC ACTIONS

Fire and rescue services should:

Revised, new, archive or no change	Strategic action	Reference No. if applicable
New	Identify if they are likely to be affected by severe weather and if so, establish business continuity plans	
New	Consider providing storage areas to protect equipment and vehicles from extreme temperatures	

TACTICAL ACTIONS

Incident commanders should:

Revised, new, archive or no change	Tactical action
New	Consider following business continuity plans for response and recovery in severe weather
New	Ensure equipment and vehicles are stored appropriately to protect them from extreme temperatures

Hazard – Naturally occurring radon [NEW]

HAZARD KNOWLEDGE

Radon is a natural radioactive gas, which has no taste, smell or colour. It is produced by the radioactive decay of uranium and thorium, found in small quantities in all soils and rocks.

Radon can reach high levels in buildings due to them often being insulated and with modern central heating causes warm air to rise, creating an air flow which draws in soil air carrying radon.

The radioactive elements formed by the decay of radon can be inhaled and enter the lungs. Inside the lungs, these elements continue to decay and emit radiation, most importantly alpha particles. These are absorbed by the nearby lung tissues and cause localised damage. This damage can lead to lung cancer.

Public Health England (PHE) produce an interactive map with current radon data which can be used as a guide to identify if locations are in a radon 'Affected Area'.

Buildings with basements are also more susceptible to high levels of radon accumulating, as there is a larger surface area in contact with the soil through which the gas can permeate. PHE advise that any property with a basement, whether or not it is located in an Affected Area, will have an increased probability of containing high radon concentrations.

Control measure – Safe system of work: Naturally occurring radon [NEW]

CONTROL MEASURE KNOWLEDGE

Under their health and safety duties as employers, fire and rescue services should consider radon as a hazard when completing workplace risk assessments.

If a workplace is identified as a potential radon Affected Area, fire and rescue services should consider carrying out further investigation, to obtain a more precise measurement and determine what action should be taken.

For more information on radon and how to reduce radon levels refer to:

- Health and Safety Executive - Radon in the workplace
- The UK Radon Association
- UKradon

STRATEGIC ACTIONS

Fire and rescue services should:

Revised, new, archive or no change	Strategic action	Reference No. if applicable

New	Identify if any of their sites are susceptible to high levels of radon	
New	Take appropriate action if the radon levels are above the permitted annual average	

TACTICAL ACTIONS

All personnel should:

Revised, new, archive or no change	Tactical action
	Be aware of the hazards associated with radon exposure

Hazard – Volcanic hazards [NEW]

This hazard should be read in conjunction with Major incidents – Major resource requirements

HAZARD KNOWLEDGE

There is potential for the UK to be affected by volcanic eruptions from other countries. The main volcanic hazards to affect the UK are:

- Gases and aerosols
- Airborne ash
- Deposition of ash
- Tsunami

Air traffic could be immediately disrupted, as volcanic ash and aerosols can cause damage, maintenance issues or, in high concentrations, potentially cause engine failure in aircraft. High concentrations of volcanic gas may be a health hazard inside aircraft.

If volcanic ash, gas and aerosols are present at ground level in sufficient quantities and for prolonged periods, they can affect human and livestock health, damage crops, contaminate water supplies and affect electricity infrastructure. Fire and rescue service response and communications could be affected due to the present of ashfall.

The risk to the UK from a volcanically-generated tsunami is extremely low and experts suggest that even a very large tsunami would be unlikely to register more than 1cm on a UK tide gauge.

Control measure – Responding to volcanic hazards [NEW]

CONTROL MEASURE KNOWLEDGE

Although the risk of the UK being affected by volcanic ash fall from other countries is low, current data shows that Scotland and northern England could be affected by ash fall resulting from volcanic activity in Iceland.

Fire and rescue services that could be affected should consider business continuity plans and liaise with local emergency planning groups and local authorities to establish a point of contact, and their roles and responsibilities should an event occur.

A nominated team, which is usually the fire control room, should be given the responsibility to liaise with the local authority point of contact. They should gather information from the point of contact and relay it to relevant operational personnel.

Fire and rescue services could support their local communities affected by:

- Establishing exclusion zones
- Assisting with evacuations
- Transporting essentials, such as food and water

Any support arrangements that fire and rescue services may carry out should not be to the detriment of providing an emergency response. Fire control rooms should be notified if any community support arrangements could impact mobilising to incidents.

STRATEGIC ACTIONS

Fire and rescue services should:

Revised, new, archive or no change	Strategic action	Reference No. if applicable
New	Identify if they are likely to be affected by volcanic ashfall and if so, establish business continuity plans	
New	Liaise with local emergency planning groups and local authorities to establish their roles and responsibilities if their area could be affected by volcanic ashfall	
New	Establish a point of contact with local authorities if their area could be affected by volcanic ashfall	
New	Nominate a team that is responsible for liaising with the local authority point of contact to gather information about volcanic hazards and relay to relevant operational personnel	

TACTICAL ACTIONS

Incident commanders should:

Revised, new, archive or no change	Tactical action
New	Implement local business continuity plans for volcanic ashfall
New	Consult with local authorities on support arrangements required to be carried out by fire and rescue service personnel in the event of volcanic ashfall

Fire control personnel should:

Revised, new, archive or no change	Tactical action
New	Liaise with the local authority to gather information about volcanic ashfall and relay to relevant operational personnel

Removed content

Control measure – Plan reception centres [PUBLISHED IN OTHER GUIDANCE]

Control measure – Cordon controls [PUBLISHED IN OTHER GUIDANCE]

Control measure – Evacuation and shelter [PUBLISHED IN OTHER GUIDANCE]

Control measure – Identify areas that have been searched [PUBLISHED IN OTHER GUIDANCE]

Control measure – Specialist resource: Helicopter [PUBLISHED IN OTHER GUIDANCE]

Control measure – Liaise with local emergency planning groups [PUBLISHED IN OTHER GUIDANCE]

Control measure – Communication strategy: Water rescue and flooding [PUBLISHED IN OTHER GUIDANCE]

Control measure – Warn, inform and advise people: Flooding [CONTENTS MERGED]

Control measure – Reduce exposure to hazards [PUBLISHED IN OTHER GUIDANCE]

Control measure – Specialist advice [PUBLISHED IN OTHER GUIDANCE]

Control measure - Remove blockages [CONTENTS MERGED]

Control measure – Personal protective equipment (PPE): Water rescue and flooding (PUBLISHED IN OTHER GUIDANCE)

Control measure – Safety officers: Water rescue and flooding (PUBLISHED IN OTHER GUIDANCE)

Control measure – Cordons: Water rescue and flooding (PUBLISHED IN OTHER GUIDANCE)

Control measure – Appropriate techniques for removal of casualties from unstable surfaces [PUBLISHED IN OTHER GUIDANCE]

Control measure – Spread the load [PUBLISHED IN OTHER GUIDANCE]

Control measure – Have an effective recovery system [PUBLISHED IN OTHER GUIDANCE]

Unstable surfaces and landslides [CONTENTS MERGED]

Control measure – Specialist advice: Unstable surfaces [CONTENT RELOCATED]

Control measure – Monitor ground conditions [CONTENT RELOCATED]

Control measure – Use geological monitoring equipment [CONTENT RELOCATED]