Northern Ireland
Fire & Rescue Service

STANDARD OPERATING PROCEDURE NO 4C

Flooding Incidents

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Protecting Our Community

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NORTHERN IRELAND FIRE & RESCUE SERVICE

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FLOODING INCIDENTS

INTRODUCTION

Incidents involving flood water have become more frequent in recent years. The scale of flooding can range from localised domestic flooding to a wide-scale "major flooding event" which may have the capacity to cause catastrophic damage to the community. The initial phase of such incidents will almost always involve Northern Ireland Fire & Rescue Service (NIFRS), whose response will range from a single appliance or officer for localised incidents, to a request for national assets, for prolonged or more widespread incidents. Any operational deployment to flooding will present a serious risk to those involved, therefore it is essential that the inherent hazards, control measures and tactical options are understood by all personnel.

1 – SECTION A

1.1 TYPES OF FLOODING

1.1.1 FLASH FLOODS

Intense localised rainfall which greatly exceeds the capacity of drainage systems, causing rapid and very severe run-off which is hard to predict; an extreme example is Boscastle.

1.1.2 FLUVIAL FLOODING

Flooding due to high water levels in rivers.

1.1.3 COASTAL INUNDATION

High tides and storm surges affect coastlines or tidal rivers.

1.1.4 MAJOR FLOOD EMERGENCIES

Flow of water onto normally dry land, caused by a variety of factors such as poorly maintained drains, breaches of banks/defences, snowmelt, saturated ground or hard and dry ground. This is a longer term event than "flash flooding", lasting days or weeks.

1.2 ROLE OF NORTHERN IRELAND FIRE & RESCUE SERVICE (NIFRS)

The role of NIFRS at flooding events will be as follows:

- saving of life or rescuing of those trapped;
- assisting with the evacuation of those in danger;
- mitigating environmental damage (built and natural);
- assisting other agencies with casualty handling/removal of bodies;
- operations to minimise damaging effects on the community, eg, pumping out;
- protection of critical infrastructure.

1.3 MOBILISING

In NIFRS, flooding incidents have been categorised into 5 scenarios which may require the attendance of NIFRS resources. These categories are:

1.3.1 Flooding affecting a single property caused by leak/overflow.

This will attract an "Officer Attendance Only" for assessment purposes.

1.3.2 Significant local flooding affecting property and/or the road network with **NO** life risk – usually involving a request to pump out water.

This will attract an "Officer Attendance Only", where available. If not immediately available, one pump will be mobilised for assessment purposes.

1.3.3 Significant local flooding trapping people in their cars and/or homes – no apparent need of rescue but there may be a need for people to be removed to a place of safety.

The Regional Control Centre (RCC) will mobilise one pump, nearest officer and the Special Rescue Team (SRT).

1.3.4 Significant flooding affecting a general area with persons not accounted for – no obvious rescues required but cars and/or homes may need to be searched to ensure everyone has left the property.

The RCC will mobilise one pump, nearest officer and the SRT.

1.3.5 Any flooding affecting property and/or road network with persons in the water or where persons are known or suspected to be in danger, eg, trapped in cars, stranded by rising flood water, unable to access vital medical help/support services, etc.

The RCC will mobilise full normal water rescue attendance, including the SRT.

1.4 HAZARD AWARENESS

It is important to have an understanding of the hazards that may be encountered at flooding incidents in order to conduct a comprehensive risk assessment and to determine the appropriate control measures and operational tactics.

With flooding incidents there are a number of reasonably foreseeable specified risks which NIFRS personnel may encounter.

A specified risk means a risk of:

- drowning due to body entrapment;
- drowning due to becoming trapped by rising flood water;
- drowning due to the loss of balance in fast-flowing water or loss of "hard surface", eg, unseen holes, change in level of ground;
- injury due to collapse/falling objects caused by pressure of water;
- injury due to debris carried by fast-flowing water;
- short to medium term illness caused by contamination of flood water.

1.4.1 GENERIC HAZARDS ASSOCIATED WITH FLOODING INCIDENTS:

1.4.1.1 **Rising/Fast-Flowing Water**

An early assessment of the rate at which water is rising/dissipating or flowing is essential, and will be a significant consideration for the Incident Commander (IC) in the risk assessment process. *Remember* – 6 inches of fast-flowing water can knock an adult off their feet. Standard Operating Procedure (SOP) No 4A (Water-Related Incidents – Water Awareness) details the hazards associated with moving water. Consider changes in water level and weather conditions during risk updates.

1.4.1.2 **Sub-Surface Hazards**

Personnel must be aware of potentially unseen hazards whilst driving or walking through flooded roads/streets, eg, manhole covers forced off due to the initial surge of flood water. As water levels subsequently recede, the suction effect from the unseen manhole can create a greater hazard to both the public and NIFRS personnel. Steps, bollards, sharps, drains, sudden change in depth, etc, may also cause injury or entrapment. Wading poles should always be used to indicate sub-surface hazards and changes in depth.

1.4.1.3 **Contamination**

Large-scale flooding incidents can effectively be considered as "hazmat" incidents, due to the variety of pollutants and biohazards commonly found in flood water. Chemicals, industrial waste, oil/petrol, raw sewage and dead animals are examples of potential contaminants, highlighting the need for effective decontamination of responders and casualties.

Personnel with open cuts, etc, should not be deployed near flooding incidents, and if unavoidable, waterproof plasters should be used. Personnel should re-familiarise with the health effects of water-borne contaminates as detailed in SOP No 4A.

Vaccinations for diseases such as Hepatitis A and B, also tetanus, are effective control measures. Members of the public should be advised to avoid contact with flood water if possible. NIFRS personnel must ensure personal decontamination prior to eating, drinking, smoking or toileting.

For flood water more than a few inches deep, teams with specialist Personal Protective Equipment (PPE), such as dry suits, which will give protection from water ingress, cold, and contamination, will be required. This equipment, unlike structural fire kit, can then be easily decontaminated.

1.4.1.4 Debris Flow

Mud or rockslides can be caused by water run-off. Isolated flash floods can occur without warning as "dammed" debris which has caused a build-up of flood water suddenly releases. Personnel should also be aware of the risk of potentially large objects being carried in the flood water, eg, trees, or cars.

1.4.1.5 Vehicles in Water

As 2 feet of water can float cars and buses, appliances should not be driven through such deep water. The possibility of open manholes and road surface subsidence should also be considered when negotiating flooded streets or roads.

1.4.1.6 Basements

Risk from darkness, unpredictable layout or sudden change in depth.

1.4.1.7 Electrical

Premises may not have been isolated or power supply tripped out prior to entry.

1.4.1.8 Manual Handling

Personnel engaged in rescue or evacuation of the public from their property may have to physically carry them out of the hazard zone. Casualty handling techniques should be used to prevent injury or exertion.

1.4.1.9 Rural

Rivers, streams and drainage ditches may be deep and difficult to locate when flooded, this hazard increasing significantly at night. Fences, gates and hedges can act as strainers when in the path of fast-flowing water. Anyone pinned in this position will be at serious risk of drowning.

1.4.1.10 **Fatigue/Hypothermia/Stress**

Personnel deployed for long periods in harsh weather and spate conditions may begin to feel the effects of fatigue or hypothermia. ICs should ensure timely consideration for reliefs, rest and feeding. Firefighters working in their local communities may suffer emotional stress due to the effects of flood damage on their friends' or families' property.

2 – SECTION B

2.1 PRE-PLANNING

A review of flooding incidents which occurred in 2007 and 2008 has indicated that there are locations where it is reasonably foreseeable flooding will occur due to heavy rainfall and/or the capacity of the existing drainage system. This knowledge, in addition to the generic hazard awareness information, will enable personnel to develop site or event specific plans for flooding, which should include the potential hazards, control measures and operational intelligence information relevant to their District.

An example of this would include knowledge of local arrangements for Police Command Rooms, Council Rest Centres, site plans of housing in the flood plain area and the location and direction of flow of storm drains. Experience has shown that the latter information is particularly useful when planning High Volume Pumping (HVP) operations.

2.2 OPERATIONAL CONSIDERATIONS

When developing a site/event specific pre-plan or when an IC is developing a tactical plan, the following factors should be considered in addition to the hazard awareness information.

2.2.1 ACCESS

Routes to affected areas may be impassable due to floods. The RCC may not have sufficient information to advise on alternative clear roads. For ICs, this will be the beginning of the risk assessment process.

2.2.2 SCENE ASSESSMENT

On arrival, the IC will consider:

- the extent of flooding and associated risks;
- the number of people/properties likely to be affected;
- additional or specialist resources required, eg, Command Support Unit (CSU), swift water rescue/boat trained teams, HVPs;
- a suitable location for Rendezvous Points and Marshalling Areas;
- the need to liaise with other agencies on scene;
- the demarcation of Inner and Outer Cordons;
- the appropriate level of Incident Command System (ICS), use of functional officers, eg, Safety Officer;

- decontamination;
- welfare, feeding, reliefs.

2.2.3 TACTICAL PLANNING

After gathering all relevant information and liaising with any other responding agencies, the operational plan will be formulated. This will depend on the need to rescue/evacuate those affected by flooding. Depending on the anticipated water level, advice may be given to householders to remain in their houses until flooding recedes; this would be a risk assessed strategic decision, taken in consultation with other agencies. In line with national risk assessment guidance, ICs should normally default to defensive mode until a safe system of work is established.

2.2.4 PERSONAL PROTECTIVE EQUIPMENT (PPE)

Personnel entering the Inner Cordon (Hazard Zone) or are within 3 metres of the water, must wear correctly donned buoyancy aids/lifejackets. This 3 metre distance may be extended following risk assessment of working areas near water hazards. The use of "working at height" equipment (if available) may be considered to prevent rescuers getting into an unsafe working position, eg, creation of a temporary lifeline.

2.2.5 RESCUES

Rescues from fast-flowing or deep flood water will, after a Dynamic Risk Assessment (DRA), be attempted in accordance with SOP No 4B (Operational Tactics for Water-Related Incidents) using the safety control measures contained therein. Crew members must not enter the water, but may use available equipment to effect rescues as per the "rescue formula".

2.2.6 INCIDENT LOG

Key decisions made at such flooding events must be recorded. Where persons have been rescued/evacuated from property, or refuse to leave, accurate details must be added to the log.

2.3 RESPONSIBILITIES OF THE INCIDENT COMMANDER (IC)

Is it absolutely necessary to commit crews if they would have to drive or walk through flood water?

- Restrict the number of personnel who have to operate in the Hazard Area to the minimum necessary to operate safely.
- Personnel should be fully briefed before being committed into a Hazard Area.

- Crews operating in a Hazard Area should carry floating throw lines in case a crew member gets into difficulty in flood water.

- Appoint a Safety Officer to monitor personnel who should remain within "line of sight".

- Illuminate a Hazard Area during poor visibility or darkness.

- Designate an Entry Point to a Hazard Area and account for personnel who enter it.

- Monitor the level of flooding and remain ready to withdraw personnel from a Hazard Area if rising water levels or other hazards impact on their safety.

- On no account should personnel be permitted to enter flood water for search purposes or to perform wading/swimming rescues. This is a high risk environment which requires specially trained and equipped personnel.

2.4 OPERATIONAL RESPONSE TO FLOODING INCIDENTS

2.4.1 The normal NIFRS response to flooding incidents will be a pumping appliance and the nearest officer, unless the category of call indicates that high risk search and evacuation may be required, in which case the SRT shall be mobilised.

2.4.2 Where information is received at the RCC that persons are trapped in water, then the normal water rescue attendance shall be mobilised. The crews of pumping appliances can perform a number of generic tasks at flooding incidents, including:

2.4.2.1 Pumping out where this is realistic.

2.4.2.2 Establishing booms using delivery hose inflation kits to act as a barrier in case persons are "washed away" by fast-flowing water.

2.4.2.3 Using floating throw lines where persons are trapped in water and require immediate rescue if they are to avoid drowning.

2.4.2.4 **It is important to remember that it may be better to leave someone in a place of relative safety while awaiting specialist assistance rather than drag them into flood water with the attendant danger of drowning.**

2.5 HIGH VOLUME PUMPS (HVPs)

2.5.1 NIFRS has 3 HVPs, located at Whitla Fire Station, Omagh Fire Station and Armagh Fire Station. The HVP will be mobilised on request and will attend with a supporting pump and a minimum of 6 HVP trained personnel.

2.5.2 The officer-in-charge of the attending HVP crews will act as a Tactical Advisor to the IC relating to HVP operations. It is important to remember that irrespective of the pumping capability of an HVP, it can only be successful if there is somewhere to divert the flood water to. As such, during widespread flooding, it is often difficult to remove water by pumping alone.

2.5.3 HVP crews will be issued with PPE to enable them to operate safely in localised flood conditions. Their PPE is for protection while positioning equipment. It is not for the purposes of high risk search or water rescue and ICs should not divert them from their primary task.

2.6 SPECIALIST FLOOD RESCUE RESPONSE

2.6.1 The SRT will provide the immediate specialist response to flooding incidents within NIFRS. However, NIFRS has developed the capacity to deploy multiple SRT sub-units during widespread flooding as a result of experience from previous flooding incidents involving spate conditions and significant demands on mobilising.

2.6.2 NIFRS currently has the capacity to deploy 8 Flood Rescue Response Teams. These teams will deploy with the following assets:

- 4 x Swift Water Rescue Technicians (one is a Trauma Medic);
- 1 x SRT Team Leader;
- 1 x boat/rescue sled;
- 1 x qualified Bronze Commander (Tactical Advisor);
- 1 x trauma kit;
- 1 x search management kit.

2.7 CALL SIGNS

Flood Rescue Response Team call signs are RT 01 – RT 10.

2.8 COMMAND AND CO-ORDINATION

2.8.1 Flooding incidents require a high level of command and co-ordination; in order to reflect national developments and best practice, NIFRS has developed a Flood Incident Management strategy. This is necessary since flooding incidents are usually multi-agency events and the efforts of those agencies needs to be co-ordinated.

2.8.2 While NIFRS ICS arrangements provide a framework for dealing with specific operational incidents, there is a necessity to overlay these arrangements with a command structure capable of contributing to the effective management of flooding, any operational incident resulting from that flooding, and managing the impact such events have on NIFRS's ability to maintain normal service delivery. The structure will facilitate a co-ordinated response to major flooding emergencies in defined geographical areas.

This structure has 3 levels:

- Strategic (Gold);
- Tactical (Silver);
- Operational (Bronze).

The command functions of the above levels are referred to as Gold, Silver and Bronze Command and this is a nationally recognised multi-agency command structure for Police and Ambulance Services and into which ICS can be integrated.

The structure is widely used for both pre-planned and spontaneous events and provides the flexibility to manage a varied and developing range of incidents.

2.9 BRONZE COMMAND (OPERATIONAL)

2.9.1 In NIFRS the officer responsible for the management of a specific function or sector of an incident is referred to as the Sector Commander. However, in multi-agency events, this role is often referred to as the Bronze Commander.

2.9.2 The Bronze Commander is responsible for the implementation of the Silver Commander's tactical plan by use of the appropriate operational tactics and procedures within the geographical or functional area of responsibility.

2.9.3 The Bronze Commander will be forward deployed to the affected area and will provide a risk update on the prevailing situation as a result of direct observation and consultation with crews and other agencies on the ground.

2.9.4 The Bronze Commander will also be responsible for any Forward Control Point where this is authorised and the appliances/crews located there. These appliances and crews may be deployed by the Bronze Commander following a DRA process or on the instructions of the Silver Commander.

2.9.5 The Bronze Commander may direct the deployment of these resources mobilised to his/her sector of responsibility to:

- ensure the safe and effective use of available resources;
- prevent the escalation of any incident/prevent loss of life;
- remove personnel from a safety–critical situation.

2.9.6 RESPONSIBILITIES OF THE BRONZE COMMANDER

The Bronze Commander must:

- have knowledge and a clear understanding of the Silver Commander's tactical plan and their role within it;
- keep the Silver Commander updated on current developments, including any variation in agreed tactics within their geographical or functional area of responsibility;
- be available to Crew Commanders while allowing them the flexibility to carry out their role in accordance with the overall strategy and tactical plan;
- ensure staff within their area of responsibility are fully briefed;
- be so located as to be able to maintain effective operational command of resources available to them within the defined area of functional/geographical responsibility.

2.9.7 During major flood emergencies it may be the case that a number of incidents may occur in a small geographical area. In such circumstances it may be necessary to appoint an officer to supervise the deployment of resources for that area. This officer is referred to as the Bronze Commander (Territorial).

Where an IC is responsible for one specific incident within a **wider** flooding emergency, this officer is referred to as the Bronze Commander (Functional).

2.10 SILVER COMMAND

2.10.1 In NIFRS the officer responsible for the management of an incident is referred to as the IC. In multi-agency events this role is often referred to as the Silver Commander. While NIFRS Silver Commander normally operates from a CSU, the Police Silver Commander will normally operate from a dedicated Silver Command Room at a Police Station.

Since flooding can normally affect a wide geographic area it may not always be possible for NIFRS Commander to operate from a CSU and alternative arrangements may need to be made. The options include:

2.10.1.1 Operate with Police or Council colleagues from a multi-agency Silver Command (usually the Police Silver Command Room).

2.10.1.2 Operate from an alternative location but send a NIFRS Liaison Officer to the Police Silver Command Room.

2.10.2 The Silver Commander is responsible for developing and co-ordinating the tactical plan in order to achieve the strategic intention of the Gold Commander. Operational tactics are the method by which resources are deployed to achieve the strategic intentions/ objectives within the range of approved tactical options.

2.10.3 RESPONSIBILITIES OF THE SILVER COMMANDER

The Silver Commander:

- must be located so as to be able to maintain effective tactical command of operations;
- must ensure that all decisions are documented to provide a clear audit trail;
- provides the link between Bronze Commanders and the Gold Commander and ensures all commanders are updated on developments;
- is responsible for ensuring that all staff are fully briefed;
- must review, update and communicate any changes to the tactical plan to Bronze Commanders and the Gold Commander;
- is responsible for ensuring the tactics employed by Bronze Commanders meet strategic objective and tactical plan.

2.10.4 The Silver Commander may also request that the RCC:

- do not mobilise crews to a well-defined geographical location for a temporary period – this must be subject to review every 30 minutes;
- mobilise a reduced attendance to any incident;
- remove special appliances from attendances;

- advise Silver Command of certain incident types to facilitate an "Officer Attendance Only", where appropriate;

- contact individual call signs and instruct them to withdraw from an incident or return to station.

2.10.5 The Silver Command may:

- contact call signs directly and provide them with safety-critical information or instructions;

- forward deploy additional resources such as appliances and officers forming part of a contingency planning process.

2.11 GOLD COMMAND

2.11.1 In NIFRS, Gold Command may operate where there are a number of incidents across NIFRS area and where there are competing demands for available resources. NIFRS Gold Commander is not in charge of any individual incident but does have overall responsibility for NIFRS resources. As such, it may be necessary to develop a Gold Command strategy to prioritise the allocation of resources, eg, during spate conditions calls or where there is a life risk. It may also be necessary to prioritise the use of available resources to protect critical national infrastructure such as hospitals, major road networks, etc.

2.11.2 During a major flood emergency NIFRS Gold Commander will normally be located in the Command Room at the RCC.

2.11.3 RESPONSIBILITIES OF THE GOLD COMMANDER

The Gold Commander:

- should develop a strategy for the allocation of NIFRS resources on an organisation-wide basis;

- should be a member of any multi-agency Strategic Co-ordinating Group in the event of an incident/event, or designate an NIFRS Strategic Co-ordinating Group Liaison Officer to perform this role with the authority of the Gold Commander;

- should prioritise requests for available resources where demand exceeds capacity;

- should set, review and update the strategy;

- should be located in a position to maintain effective strategic command of the operation;

- should consult with partner agencies when determining the strategy;

- must maintain objectivity;
- must be available to the Silver Commander, if required;
- must ensure that the strategy for the event is documented in order to provide a clear audit;
- must review any Silver Command tactical plan and ensure that it meets the strategic intention/objective for the event/incident;
- is responsible for ensuring the resilience of the command structure.

2.12 SPECIALIST OPERATIONS CO-ORDINATION CENTRE

2.12.1 Experience of flooding incidents across the United Kingdom has shown that the use of a Flood Co-ordination Centre is vital in order to co-ordinate and sustain the deployment of specialist assets such as SRT, Flood Rescue Response Teams, Royal National Lifeboat Institution and voluntary agencies over the timeline of the flood emergency. To reflect national arrangements and best practice relating to the deployment of specialist teams, NIFRS has developed a Specialist Operations Co-ordination Centre (SOCC) based at Eastern Command Headquarters. The SOCC is responsible for co-ordinating the deployment of the following assets:

- Specialist Rescue Team;
- Operational Support Group;
- Marine Incident Response Group;
- NIFRS Urban Search and Rescue Task Group.

2.12.2 The RCC retains responsibility for mobilising resources, however, strategic reserves and forward deployments are co-ordinated by the SOCC in addition to rotation of crews and logistical support to specialist teams. Direct contact is maintained between the SOCC and RCC and NIFRS Headquarters Command Room (Gold Command).

2.13 MULTI-AGENCY GOLD COMMAND

Often referred to as the Strategic Co-ordinating Group (SCG), this is made up of senior representatives of the Emergency Services and other statutory agencies. The purpose of the SCG is to develop an overall strategy for dealing with the emergency.

3 – SECTION C

3.1 POST-INCIDENT CONSIDERATIONS

- Decontamination of personnel, PPE, equipment and vehicles.
- Resilience – food, rest, PPE replacement, equipment rehabilitation.
- Safety events – reported and processed.
- Completion of incident logs.
- Structured debrief, allowing all personnel to learn from significant incidents.
- Review/amend procedures, equipment and training accordingly.

CONCLUSION

The risk information, control measures and operational guidance contained within this SOP have been developed following comprehensive research into major flood events and the guidance reflects national policy in this rapidly developing area of operations. NIFRS is represented at both a tactical and strategic level on the Chief Fire Officers' Association Inland Water Strategy Group (IWSG) and the principles contained within the SOP have been validated as a result of local, national and international exercises and training events. As such, adherence to the guidance within the SOP will enable NIFRS to address public expectations relating to emergency response to major flood events while contributing to a safer operating environment for personnel.

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Ref: AW/RS

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