CabinetOffice

National Risk Register of Civil Emergencies

2012 edition

Contents

1. Introduction

Using this document

1.1 **This chapter** explains what an emergency is, according to the Civil Contingencies Act 2004, and how the risks of emergencies are identified and calculated.

1.2 **Chapter 2** provides an overview of the main kinds of civil emergency that could affect people in the UK. This includes graphical representations of how the main risks of emergency compare with one another in terms of their likelihood, and the scale and extent of their consequences.

1.3 **Chapter 3** outlines in more detail the risks of civil emergencies – both hazards and terrorist threats – and how the Government and emergency responders are planning to prepare for and respond to them. For local assessments of how far these and other risks apply in your area, consult your Community Risk Register or, for Scotland and Northern Ireland, consult the relevant devolved administration's website.

1.4 For **public, private and voluntary sector organisations and businesses**: familiarise yourself with the risks outlined in chapter 3 and then read 'Considerations for businesses and organisations' online at: http://www.cabinetoffice.gov.uk/sites/default/files/resources/Chapter_3-Considerations_for_business_and_organisations-2010_Edition.pdf

1.5 For **members of the public**: familiarise yourself with the risks outlined in chapter 3 and your local Community Risk Register, and then read 'Preparing yourself, your family and your community for emergencies' online at: http://www.cabinetoffice.gov.uk/sites/default/files/resources/Chapter_4-Preparing_yourself_your_%20family_and_your_community_for_emergency-2010_Edition.pdf

Purpose

1.6 The *National Risk Register of Civil Emergencies* (NRR) is a reference document for individuals and organisations wishing to be better prepared for emergencies. This is the second revision of the NRR since its original publication in 2008, and provides updated information on the types of civil emergency that people in the UK could face over the next five years.

What is a civil emergency?

1.7 The Civil Contingencies Act 2004 (the Act) describes a civil emergency as:

- **an event or situation which threatens serious damage to human welfare in a place in the United Kingdom** – where serious damage is defined as 'loss of human life; human illness or injury; homelessness; damage to property; disruption of a supply of money, food,

water, energy or fuel; disruption of a system of communication; disruption of facilities for transport; or disruption of services relating to health'

- **an event or situation which threatens serious damage to the environment of a place in the United Kingdom –** where environmental damage is defined as 'contamination of land, water or air with biological, chemical or radio-active matter, or disruption or destruction of plant life or animal life', and/or

- **war, or terrorism, which threatens serious damage to the security of the United Kingdom.**

What is a risk of civil emergency?

1.8 Every year the Government carries out a classified assessment of the risks of civil emergencies facing people in the UK – this is called the National Risk Assessment (NRA). The NRR is an unclassified, public version of the NRA. In both the NRA and the NRR, how serious the risk of an emergency is depends both on the **likelihood** of it happening over the next five years, and on the **consequences or impacts** that people will feel if it does. The highest risks are therefore those that are highly likely to happen and have the highest impact if they do.

How are civil emergencies identified?

1.9 Emergencies are inherently hard to predict, so the first stage in assessing the

emergencies is to **identify the risks**. This is done by consulting experts in government departments and beyond, who between them identify instances of possible major accidents, natural events (hazards) and malicious attacks (threats) that are reasonably likely to happen, and could cause significant harm and disruption in the UK in the next five years. A '**reasonable worst case**' is chosen, which represents a challenging manifestation of the scenario after highly implausible scenarios are excluded.

1.10 In the NRA, this consultation has produced a list of some 80 types of scenario that would meet the definition of a civil emergency given in the Act. A further 40 or so are placed on a reserve list because, although they have been judged not to meet the definition, the experts consider that they may do so in the future and therefore need to be kept under review.

1.11 The NRA and the NRR therefore cover:

- all kinds of emergency that meet the definition given in the Act (above) but **not** every conceivable instance of an emergency, and not everyday occurrences – such as street crime – that can cause extended misery and damage over a long period of time but are not 'emergencies' within the meaning of the Act

- risks that are likely to happen in the next five years, but **not** risks that are only likely to materialise in the longer term

- risks of emergencies that directly and significantly damage human welfare or the environment somewhere in the UK, but

not events that happen overseas unless they directly affect the UK.

How is the likelihood of civil emergencies assessed?

1.12 The NRA and the NRR estimate the likelihood of identified events happening within a broad range (see figures 1 and 2 on page 8). For some risk scenarios, data such as historical analysis and numeric modelling are used to inform estimates of likelihood (especially for naturally and accidentally occurring hazards). Where this is possible, a combination of this analysis and expert judgement is used to estimate the approximate likelihood of the event or situation occurring.

1.13 The likelihood of terrorist or other malicious attacks is assessed more subjectively. The willingness of individuals or groups to carry out attacks is balanced against an objective assessment of their capability – now and, as far as possible, over the next five years – and the vulnerability of their potential targets.

1.14 To demonstrate the different approach to the assessment of likelihood for hazard and threat risks, hazards and threats are shown on two separate risk matrices (figures 1 and 2 on page 8). The two scales are not directly comparable with one another; for example, a 'high' plausibility threat does not necessarily have a 'greater than 1 in 2' chance of occurring. For the purposes of planning, however, a hazard or threat in the top right quadrant of either matrix would be given the same priority.

How is the impact of civil emergencies assessed?

1.15 The NRA and the NRR take account of the definition of an emergency given in the Act in assessing the expected consequences of an emergency as follows:

- the number of **fatalities** that are directly attributable to the emergency

- **illness or injury** caused to people over the period following the onset of the emergency

- levels of **social disruption** to people's daily lives. Ten different types of disruption are taken into account, from an inability to gain access to healthcare or schools to interruptions in supplies of essential services such as food, water and fuel, and to the need for evacuation of individuals from an area

- **economic harm** – the effect on the economy overall, rather than the cost of repairs

- the **psychological impact** that an emergency may have, including widespread anxiety, loss of confidence or outrage that communities may experience.

1.16 Each of the dimensions listed above is scored on a scale of 0 to 5. The overall impact, which indicates the relative scale and extent of all the impacts, is the mean of these five scores.

How should the risk assessment be used?

1.17 The NRR provides the basic information needed for planning for emergencies:

- Figures 1 and 2 in chapter 2 give a broad indication of the relative likelihood, and the relative impact, of each of the main groups of risk in the country as a whole. This is designed to provide a starting point for readers interested in **knowing what the highest risks are**. But the risks will differ in likelihood and impact from place to place within the country, so emergency planners should cross-refer the NRA with information on local risks published in Community Risk Registers by Local Resilience Forums (which can be accessed via www.cabinetoffice.gov.uk/content/local-resilience-forums).

- Chapter 3 illustrates in more detail the types of emergency that can happen in the country as a whole. These are designed to help readers to **identify** and visualise the risks. They give examples of the most serious instances in recent history.

- In the event of an emergency, it is often not the events themselves that people have to deal with, but their **consequences**. Many of these consequences are common to a number of quite different kinds of emergency. For example, both a large flooding event and a malicious chemical attack would result in a significant number of displaced people.

- But some of the impacts of emergencies may not themselves be so predictable. Chapter 3 identifies not only the direct impacts of common types of emergency, but also the more complex, indirect or knock-on effects.

Local preparations for emergencies

1.18 Most emergencies are best managed by local emergency responders and emergency planners. The Civil Contingencies Act 2004 provides a common framework for their planning, putting a duty on emergency planners and responders to identify and assess the risks of emergencies affecting the area in which they operate, and the Government provides guidance on this based on the NRA. They must also maintain emergency response plans for these risks, and ensure their own business continuity so that they themselves are able to work effectively during emergencies. Many local communities also plan for emergencies and they will want to think about developing their own local risk register as part of their Community Emergency Plan.

National preparations for emergencies

1.19 For each of the types of risk in chapter 3, a lead government department is identified and is responsible for the day-to-day policy oversight and the coordination, support and overall management of the central

government response to an emergency. Many of the departments or agencies have websites giving more information on their work to prepare for these risks. For emergencies on a larger scale, the Government has developed:

- the *Central Government's Concept of Operations*, a flexible set of response arrangements for coordinating the response to significant emergencies: www.cabinetoffice.gov.uk/resource-library/central-government%E2%80%99s-concept-operations

- a National Resilience Capabilities Programme, which aims to build a range of capabilities for emergencies: www.cabinetoffice.gov.uk/content/capabilities-programme

- contingency plans for responding to the most concerning risks of emergency identified in the NRA – see chapter 2

- a Strategic National Framework on Community Resilience, which explores the role and resilience of individuals and communities before, during and after an emergency: www.cabinetoffice.gov.uk/content/community-resilience

1.20 Scotland, Wales and Northern Ireland all have their own resilience arrangements but these are broadly consistent with those outlined above. Details on their civil protection arrangements can be found at:

- Scotland: www.readyscotland.org

- Wales: http://wales.gov.uk/resilience/home/?lang=en

- Northern Ireland: www.ofmdfmni.gov.uk/civil-contingencies

2. Overview of the main types of civil emergency

2.1 Catastrophes on the scale of the 2011 earthquake and tsunami in Japan are thankfully rare in the UK. Over the past few years, however, we have seen various emergencies of one sort or another that still have a significant impact on our ability to go about our daily lives.

The highest priority risks

2.2 The following are considered by the Government to be the highest priority risks, taking both likelihood and impact into account:

- **Pandemic influenza** – This remains the most significant civil emergency risk. The outbreak of H1N1 influenza in 2009 ('swine flu') did not match the severity of the scenario that we plan for and is not necessarily indicative of future pandemic influenzas; the three influenza pandemics of the 20th century (1918–19, 1957–58 and 1968–69) all had differing levels of severity. The 2009 H1N1 pandemic does not change the risk of another pandemic emerging (such as an H5N1 (avian flu) pandemic) or mean that the severity of any future pandemics will be the same as the 2009 H1N1 outbreak. (For further details see page 9.)

- **Coastal flooding** – The risk is of an event similar to the 1953 east coast flooding emergency – which was the last occasion on which a national emergency was formally declared in the UK – caused by a combination of high tides and a major sea surge resulting from gale force winds. A less serious storm surge of this nature happened in November 2007 without causing damage on the scale of the 1953 emergency. Our assessment is that we are less vulnerable overall now to such flooding due to improvement in flood defences but, were a storm surge on such a scale to breach coastal flood defences, the impacts would be potentially more serious than in 1953. (For further details see page 14.)

- **Catastrophic terrorist attacks** – Although mass impact terrorist events are unlikely, the 9/11 attacks showed us that they cannot be ruled out. The likelihood of terrorists obtaining effective mass-impact biological agents or a functioning nuclear device remains low but not negligible; and the impacts are potentially very serious. CONTEST, the Government's counter-terrorism strategy, is prioritising efforts both to stop terrorists gaining access to the expertise and materials they need to deliver attacks of this nature, and to prepare for the consequences should they nevertheless succeed. (For further details on unconventional attacks see page 48.)

- **Severe effusive (gas-rich) volcanic eruptions abroad** – The 2010 eruption of the Eyjafjallajökull volcano in Iceland

showed some of the consequences that a volcanic eruption abroad can have on the UK and its citizens. Following consultation with geological and meteorological experts about the potential risks the UK faces from volcanic eruptions in Iceland or elsewhere, the assessment is that there are two main kinds of risk from volcanic eruptions. The first is an ash-emitting eruption, similar to that in 2010. The second, which is slightly less likely than an ash-emitting eruption, but which could have widespread impacts on health, agriculture and transport, is an effusive-style eruption on the scale of the 1783–84 Laki eruption in Iceland. This second type of eruption is now one of the highest priority risks in the NRA and the NRR. (For further details see page 17.)

Newly assessed risks

2.3   The main differences since the 2010 edition of the NRR are the addition of the following risks:

*   emergencies caused by **volcanic eruptions** such as that in Iceland (see above), and

*   **severe space weather** – Space weather covers a range of different phenomena, including solar flares, coronal mass ejections and solar energetic particle events. Severe space weather can cause disruption to a range of technologies and infrastructure, including communications systems, electronic circuits and power grids. The 'reasonable worst case' for a severe space weather event is based on the so-called **Carrington Event** in 1859,

which saw some of the largest space weather phenomena ever recorded. (For further details see page 20.)

The NRR risk matrix

2.4   **Figures 1 and 2** below summarise the 2011 NRA. **Chapter 3** provides more detail on each of these risks, including information on what the Government and emergency responders are doing to prepare for them.

2.5   Some of the risks – in particular the risks of terrorist attack – are analysed in more detail in the NRA than in figures 1 and 2. To show this degree of detail would in many cases reveal classified information about the threat and the vulnerability of national assets; where this is the case, the risks have been grouped together and describe a broad risk category. These categories are shown in **bold** text in figures 1 and 2, and their positioning has been set to best reflect all of the risks that make up the category.

2.6   Risks shown not in **bold** text in figures 1 and 2 appear exactly as they do in the NRA.

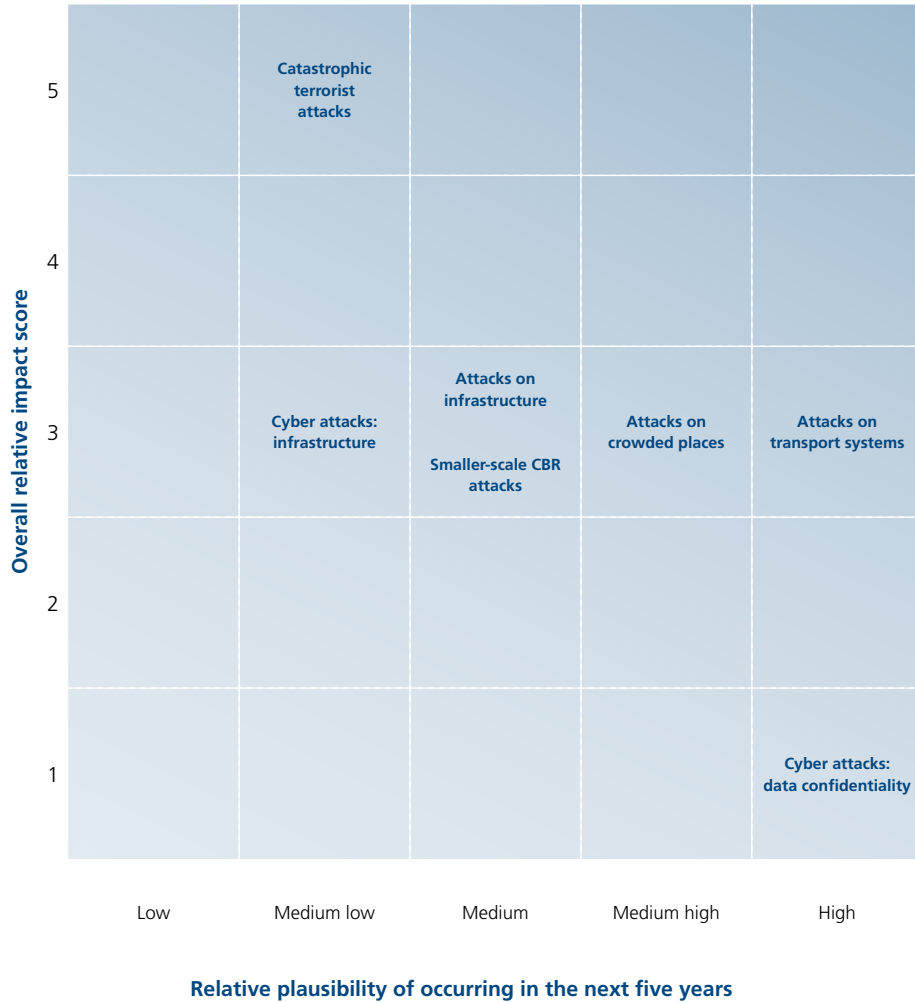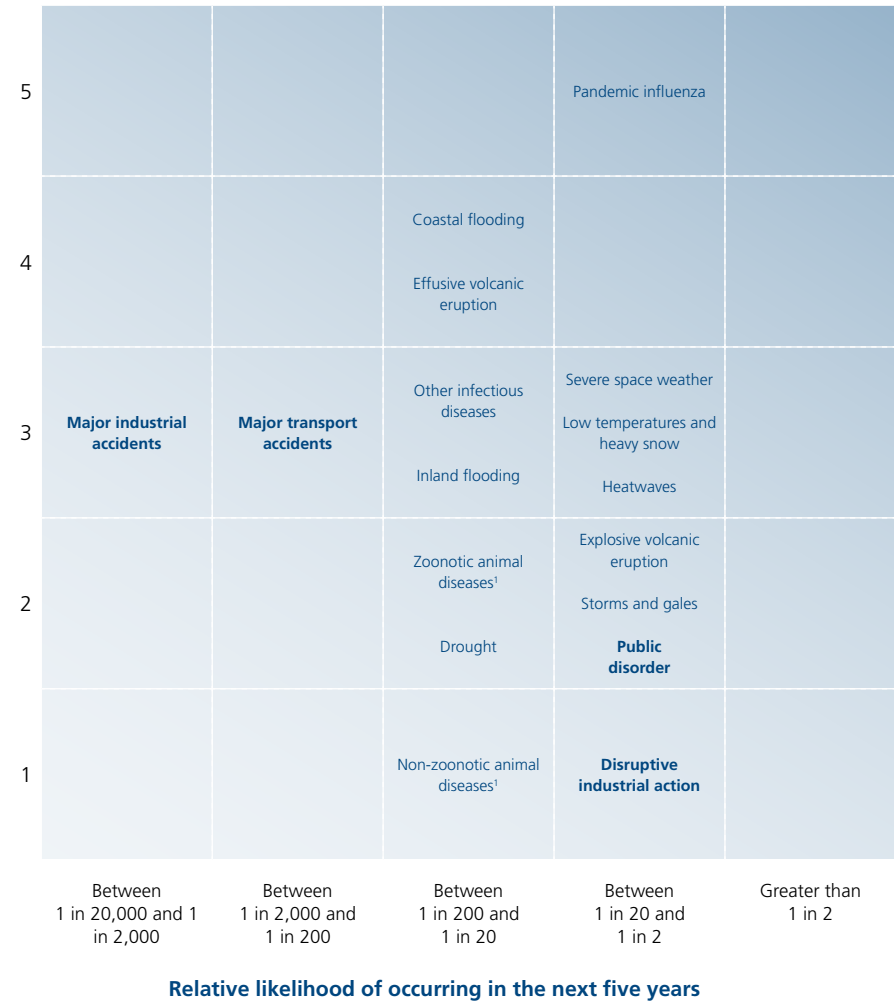## Figure 1: Risks of terrorist and other malicious attacks

Overall relative impact score

	Low	Medium low	Medium	Medium high	High
5		**Catastrophic terrorist attacks**			
4					
3		**Cyber attacks: infrastructure**	**Attacks on infrastructure** / **Smaller-scale CBR attacks**	**Attacks on crowded places**	**Attacks on transport systems**
2					
1					**Cyber attacks: data confidentiality**

Relative plausibility of occurring in the next five years

Figure 2: Risks of natural hazards and major accidents

	Between 1 in 20,000 and 1 in 2,000	Between 1 in 2,000 and 1 in 200	Between 1 in 200 and 1 in 20	Between 1 in 20 and 1 in 2	Greater than 1 in 2
5				Pandemic influenza	
4			Coastal flooding / Effusive volcanic eruption		
3	**Major industrial accidents**	**Major transport accidents**	Other infectious diseases / Inland flooding	Severe space weather / Low temperatures and heavy snow / Heatwaves	
2			Zoonotic animal diseases[1] / Drought	Explosive volcanic eruption / Storms and gales / **Public disorder**	
1			Non-zoonotic animal diseases[1]	**Disruptive industrial action**	

Relative likelihood of occurring in the next five years

[1] Zoonoses are infections and diseases that are naturally transmissible between vertebrate animals and humans.

3. Risk descriptions

Natural hazards

Human disease

Risk

3.1 Human diseases can take a variety of forms and consequently their impacts can vary considerably in both scale and nature. The main types of human disease that represent new or additional risks to the UK are outlined below. The examples have been chosen to give an impression of the range of possible diseases that would have a significant disruptive effect, but are by no means exhaustive.

Background

Pandemic influenza

3.2 Influenza pandemics are natural phenomena that have occurred over the centuries, including three times in the last century and most recently the 2009 H1N1 influenza pandemic. The symptoms caused by an influenza pandemic are similar to those of seasonal influenza but may be significantly more severe. Influenza pandemics arise because of new influenza viruses that are markedly different from recently circulating influenza viruses, which means that few people, if any, have immunity. The rapid spread from person to person which can take place during pandemics can have significant global human health consequences. In addition to the severe health effects, a pandemic is also likely to cause significant wider social and economic damage and disruption. The H1N1 influenza pandemic in 2009 reminds us of the ongoing risk.

3.3 The most notable influenza pandemic of the last century occurred in 1918–19 and is often referred to as 'Spanish flu'. It caused serious illness, an estimated 20–40 million deaths worldwide (with peak mortality rates in people aged 20–45) and major disruption. In the UK alone, there were an estimated 228,000 additional deaths. While the pandemics in 1957 and 1968 (often referred to as 'Asian' and 'Hong Kong' flu respectively) were much less severe, they also caused significant illness levels – mainly in young and older people – and an estimated 1–4 million deaths worldwide between them. The impact of the 2009 H1N1 pandemic is still being assessed; however, the outbreak in 2009 generally caused mild disease although it did cause more severe disease in some cases.

3.4 The consensus view among experts is that there is a high probability of another influenza pandemic occurring, and this probability is unchanged, regardless of the recent H1N1 influenza pandemic. It is impossible to forecast its timing or the nature of its impact. Based on historical information, scientific evidence and modelling, the following possibilities exist:

- Many millions of people around the world could become infected, causing global disruption and a potential humanitarian crisis. The latest World Health Organization[2] estimates are that between 2 million and 7.4 million deaths may occur globally.

- In the UK, up to one half of the population could experience symptoms; potentially hundreds of thousands of deaths may occur. It is likely that there will be widespread social and economic disruption; significant threats to the continuity of essential services; lower production levels; shortages; and distribution difficulties.

- Individual organisations may suffer from the pandemic's impact on staff absenteeism, therefore reducing the services available.

New and emerging infectious diseases

3.5 An emerging infectious disease can be defined as a disease that has recently been recognised or a disease of which cases have increased over the last 20 years, in a specific place or among a specific population.

3.6 Over the past 25 years, more than 30 new, or newly recognised, infections have been identified around the world. The pattern of known infections can change as the areas where some diseases are constantly present expand beyond traditional limits. Most of these newly recognised infections are zoonotic, that is they are naturally transmissible, directly or indirectly, between

vertebrate animals and humans. By their very nature, zoonotic infections can be more challenging to monitor.

3.7 Although it is unlikely that a new infectious disease will originate in the UK, it is highly probable that one will emerge in another country. Given the ease and speed with which people can travel around the world, a new infection could spread rapidly before it is detected, and be transmitted to the UK. New diseases therefore pose a potential threat to the health of the UK population, and may present social and economic challenges.

3.8 Recent examples of newly emerged infectious diseases are H5N1 (avian flu) which emerged in South East Asia and has caused several hundred human deaths, and the 2009 H1N1 virus which caused the latest influenza pandemic. Although the H5N1 virus has not developed the ability to transmit readily from person to person, in contrast the 2009 H1N1 virus clearly has, spreading quickly and widely since its emergence in Mexico in 2009. A very different example is the new haemorrhagic fever-associated Lujo virus, an arenavirus which emerged in Lusaka, Zambia in September 2008 and caused only a handful of deaths before it was contained. An example of a new disease that was not so easily contained is SARS (Severe Acute Respiratory Syndrome), which emerged in Asia in November 2002 and posed a global health threat. By the time SARS was contained in July 2003 over 8,000 people had been affected worldwide, of whom over 750 died. The majority of

those cases occurred among close family members associated with a severely ill case, and hospital workers who had cared for SARS patients.

3.9 The likelihood of a new disease like SARS spreading to the UK is low, but if an outbreak of an emerging infectious disease occurred in the UK, and containment measures were not put in place swiftly, the impact could be on the scale of the SARS outbreak in Toronto, Canada. Toronto had 251 cases of SARS in two waves over a period of several months. For every patient with confirmed SARS, there were, on average, 10 primary contacts of that patient who needed to be fully investigated and placed in isolation because they might also be incubating disease, and a further 100 secondary contacts (of the first case and of the 10 primary contacts) who also needed to be followed up.

3.10 The emergence overseas of a serious infectious disease may result in a proportion of the British nationals who are not normally resident in the UK (approximately 12 million) choosing to return to the UK. Some returning British nationals would not have the means to support themselves and their return would have a short-term but significant impact on the areas in which they settle.

Planning by the Government, the devolved administrations and the emergency responders

Pandemic influenza

3.11 The lessons we have learned from dealing with pandemics help us to develop and strengthen preparations for the potentially serious impact of any future influenza pandemic. The Government is collaborating actively with international partners on prevention, detection and research, and is taking every practical step to ensure that the UK is prepared to limit the internal spread of a pandemic and to minimise health, economic and social harm as far as possible.

3.12 The Government plans to maintain a stockpile of antivirals sufficient to treat 50% of the population. In line with current scientific advice, both oseltamivir and zanamivir have been stockpiled to ensure that the response can be as flexible and resilient as possible. The level of stocks will be kept under review in light of the scientific evidence.

3.13 The procurement of new Advance Purchase Agreements (APAs) for the supply of pandemic-specific vaccine is currently under way. Although delivery of the first batch of vaccine may not start until four to six months after the pandemic has started as it will take time to identify the strain of influenza responsible and manufacture the appropriate vaccine, the APAs mean that vaccine will be available as soon as it is developed. The Government also holds limited supplies of licensed H5N1 vaccine

which could offer some protection against an H5N1 virus.

3.14 On 10 November 2011, the *UK Influenza Pandemic Preparedness Strategy 2011* was published. The Strategy updates and replaces the 2007 National Framework for responding to an influenza pandemic. The Strategy is a UK-wide document and was developed jointly across the four UK administrations, with professional, NHS, social care and public health organisations, and based on lessons learned and advice from clinical, scientific and other experts.

3.15 While the overall approach is not substantially different from the 2007 National Framework, there are a number of key changes, reflecting the lessons learned following the 2009 H1N1 influenza pandemic and the recommendations of the independent review and other reports. Chief among these are the need to:

- develop better plans for the initial response to a new influenza pandemic, when the focus should be on rapid and accurate assessment of the nature of the influenza virus and its effects, both clinically and in relation to wider public health implications

- put in place plans to ensure a response that is proportionate to meeting the differing demands of pandemic influenza viruses of milder and more severe impact, rather than just focusing on the 'worst case' planning assumptions

- take greater account of age-specific and other differences in the rate and pattern of spread of the disease across the UK and internationally

- further explore statistical population-based surveillance, such as serology, to measure the severity of a pandemic in its early stages

- take better account of the learning from behavioural scientists about how people are likely to think, feel and behave during an influenza pandemic

- develop better plans for managing the end of an influenza pandemic – the recovery phase and preparation for subsequent seasonal influenza outbreaks.

New and emerging infectious diseases

3.16 The Department of Health has contingency plans in place for dealing with new and emerging infections and its SARS contingency plan would provide the basis for dealing with any future outbreaks should the disease re-emerge. These plans build on our generic responses to outbreaks of infectious diseases and the specific lessons learned during the SARS and other outbreaks. The containment of the SARS outbreaks globally reconfirmed that traditional public health and infection control measures can be successful in containing a new infectious disease. Early recognition of a new infection is crucial and international collaboration and the deployment of surveillance and monitoring systems are key for tackling new and emerging diseases. The remit of the Health Protection Agency (HPA) includes infectious disease surveillance, detection and diagnosis, and the provision of specialist services. The HPA has plans in place for dealing with an outbreak of

a new or emerging infection, whether arising abroad or in the UK, and would coordinate the investigation and management of any such outbreak, advising government on the public health risks and the necessary preventative and control measures. The HPA collaborates with other international surveillance bodies and undertakes horizon scanning to enable us to respond rapidly to any international health alerts.

3.17 Government departments work closely together to strengthen plans to manage an influx of British nationals which may result from a number of scenarios. The Foreign and Commonwealth Office's website provides information on pandemic influenza for British nationals living overseas, as well as travel advice by country which includes up-to-date health advice sections.

Further information

Pandemic influenza
www.cabinetoffice.gov.uk/ukresilience/pandemicflu.aspx

also

Department of Health
www.dh.gov.uk/health/category/policy areas/public health/influenza/

Health Protection Agency
www.hpa.org.uk/Topics/InfectiousDiseases/

Scottish Government
www.scotland.gov.uk/pandemicflu

Northern Ireland Executive
www.dhsspsni.gov.uk

Health Protection Scotland
www.hps.scot.nhs.uk

Public Health Agency Northern Ireland
www.publichealth.hscni.net

European Centre for Disease Prevention and Control
www.ecdc.europa.eu/

European Union
http://europa.eu/index_en.htm

World Health Organization
www.who.int/topics/influenza/en/

Flooding

Risk

3.18 The flooding across England in summer 2007 and in Cumbria and Aberdeenshire during November 2009 highlighted the various forms of flooding that the UK faces. It also highlighted the significant and widespread impact on people, businesses, infrastructure and essential services that flooding can cause. The rising temperatures and sea levels associated with climate change are likely to increase the frequency and severity of extreme weather events, and hence flood risks across the UK. The three main types (or sources) of flooding are from the sea (coastal or tidal), from rivers and streams, and from surface water (caused by excess rainfall before it enters the drainage system). All three forms of flooding could occur during a single storm. A further scenario, major reservoir dam collapse or failure, could bring about rapid flooding and is included in the industrial accidents section. The term 'inland flooding' is used to describe all forms of flooding other than coastal.

Background

Coastal flooding

3.19 Coastal flooding has the potential to have the most widespread impact in a single event.

3.20 The last significant event of this type to affect the UK was in January 1953 when the east coast of England suffered one of the biggest environmental disasters ever to have occurred in this country. Flood defences were breached by a combination of high tides, storm surge and large waves. Coastal towns and villages in Lincolnshire, Norfolk, Suffolk, Essex and Kent were devastated as seawater rushed into the streets. Over 600km^2 of land were flooded, 307 people were killed and 200 industrial facilities were damaged by floodwater. Over 32,000 people were safely evacuated. A month after the flooding the estimated cost was £40–50 million, the equivalent of around £1 billion today, not including the cost of relocation and interruption of business activity. Since 1953, much work has been done to improve flood defences. Consequently, the likelihood of defences failing or being overtopped by sea tides is now substantially lower. In particular, the construction of the Thames Barrier in London and associated flood defence systems along the east coast of England now means that there is a good level of protection against sea and tidal surges. In Wales large-scale coastal defence schemes are being progressed at a number of locations including Borth in Ceredigion, Colwyn Bay in Conwy, West Rhyl and Denbigh in Denbighshire and Riverside in Newport. These schemes are being taken forward with the support of the European Regional Development Fund and are part of a programme aiming to reduce risk for over 3,000 properties across Wales. However, the improvements in flood defences have led to significant development of homes, businesses and infrastructure behind

them. The consequences of any breach or overtopping of flood defences will now be much greater than previously experienced.

Inland flooding

3.21 The frequency of inland flooding is increasing: this is evidenced by several examples of river and surface water floods over the last few years. Of these, the events of summer 2007 were the most widespread. In June and July 2007, severe rainfall during an extremely wet summer led to the flooding of 48,000 households and 7,300 businesses across England. Other effects of recent flooding have included the closure of primary transport routes, the loss of some critical services such as electricity, telecommunications and water supplies, and large numbers of people requiring evacuation and alternative accommodation. Businesses as well as homes have been made inaccessible for many months while buildings dry out and damage is repaired. The flooding in Cumbria in November 2009 caused six bridges to collapse, severing the road network and cutting off communities.

Planning by the Government, the devolved administrations and the emergency responders

3.22 The Government has a programme of flood risk management which aims to reduce the likelihood and consequences of flooding. Local Resilience Forums[3] are required to have planning in place to assess the risk of flooding and develop appropriate contingency plans. These arrangements are constantly under review. In Scotland flooding is a devolved matter and there are equivalent measures in place.

3.23 Both the Met Office and the Environment Agency/Scottish Environment Protection Agency (SEPA), together with the Flood Forecasting Centre, maintain sophisticated monitoring and forecasting systems for the UK, to anticipate the risk of flooding and to provide early warning information on the areas likely to be impacted. For coastal, inland and ground water flooding in England and Wales, the Environment Agency provides automated flood warnings directly to customers registered on the system. This is called the Floodline Warnings Direct system and is also provided in Scotland by SEPA. The national helpline, Floodline, is available 24/7 for people to obtain information about flood risk and to learn more about what to do before, during and after a flood. Flood warning information provided centrally is complemented in some areas by local authorities through the use of sirens, where available, and door knocking.

3.24 We need to continue to learn the lessons each time a serious flooding event occurs. The Government is taking forward

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[3] Local Resilience Forums were established under the Civil Contingencies Act 2004 and are the principal mechanism for multi-agency cooperation and information sharing at the local level on civil protection planning and preparedness work carried out by Category 1 and Category 2 responders and other organisations.

recommendations from the Pitt Review[4] into the summer 2007 flooding in a programme of work to reduce the risk and impact of flooding in the future. Priorities include:

- developing better institutional arrangements for surface water management

- improving overall emergency response capability to respond to flood events, including arrangements to protect critical infrastructure and essential services

- ensuring that, where new development is necessary in areas at risk of flooding, appropriate measures are taken to minimise the risk.

Further information

Environment Agency flood pages
www.environment agency.gov.uk/
homeandleisure/floods/default.aspx

Department for Environment, Food and Rural Affairs flood pages
www.defra.gov.uk/environment/flooding/
index.htm

Scottish Environment Protection Agency
www.sepa.org.uk

Rivers Agency of Northern Ireland
www.dardni.gov.uk.riversagency

Health Protection Agency guidance on risk to health
www.hpa.org.uk/webw/
HPAweb&Page&HPAwebAutoListName/
Page/1158934608011

Public Health Agency Northern Ireland flooding information
www.publichealth.hscni.net

Northern Ireland Executive
www.dhsspsni.gov.uk/flooding_guidance.
doc#Flooding1_FAQs

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[4] The Pitt Review is an independent comprehensive appraisal of all aspects of flood risk management in England, and contains 92 recommendations addressed to the Government, local authorities, Local Resilience Forums, providers of essential services, insurers and others, including the general public.

Volcanic hazards

Risk

3.25 Volcanic eruptions abroad can have significant consequences in the UK, including disruptions to aviation and, depending on the volume of gases emitted, significant public health and environmental impacts. This subsequently leads to a number of secondary impacts, including disruption to critical supply chains and economic impacts. There are a range of volcanoes across Europe (such as Santorini in the Aegean Sea and Vesuvius in Italy) which could have consequences for the UK; but volcanoes in Iceland are of most concern because of the active volcanic nature of this region (it has 30 separate volcanic systems).

Background

3.26 The range, scale and intensity of the consequences of volcanic eruptions abroad are influenced by the characteristics and location of the volcanic eruption and weather conditions at the time. In particular it is important to distinguish between explosive and effusive styles of eruption (see below). A single eruption may involve both explosive and effusive styles.

Explosive volcanic eruption styles emitting mainly ash

3.27 In general, explosive volcanic eruptions tend to occur when relatively thick magma reaches the surface of the volcano. Gas bubbles in this type of magma are not easily released and pressure builds as magma rises to the surface. Near the surface, gas explosions blast magma and rock fragments into the atmosphere. Magma rising very rapidly may also be explosive regardless of composition; additionally, interaction of any type of magma with water will also be explosive. Consequently, the volcanic plumes resulting from this type of eruption consist of fine ash, gas and aerosols. Explosive eruptions may be characterised by pulses of intense activity interspersed with periods of reduced activity. Significant eruptions of this type can emit gases and particles into the stratosphere, above weather systems, where they may also have subsequent climatic effects.

3.28 If periods of intense volcanic activity of this type coincide with unfavourable weather conditions they can result in significant ash incursions over the UK which can result in disruption to aviation as the fine ash in the plume can, in sufficient concentrations, damage aircraft engines. High-pressure weather systems, which tend to result in more stable weather conditions, can result in prolonged periods of unfavourable weather conditions and therefore prolonged ash incursions over the UK.

3.29 Once in the atmosphere, ash, gases and aerosols are rapidly dispersed by wind, potentially resulting in higher than usual concentrations of various gases and particles at flight altitude. The ash, gases and aerosols are gradually brought down to ground level by atmospheric pressure and precipitation (for instance, rain or

snow) and this may result in higher than usual concentrations of these gases at ground level and deposits of chemicals on the ground.

3.30 In April 2010 the relatively small magnitude explosive eruption of the Eyjafjallajökull volcano in Iceland coincided with north-westerly winds and high pressure resulting in airspace closures over much of the UK and Northern Europe for six days.

3.31 Although the UK is now significantly more prepared for ash incursions (see below), our better understanding does not completely mitigate the risk and there remains the potential for relatively short periods of disruption to aviation resulting from explosive volcanic eruptions abroad.

Effusive volcanic eruption styles which emit mainly lava

3.32 Effusive volcanic eruption styles generally occur when hot, relatively runny magma reaches the surface of the volcano. Gas bubbles can usually separate easily from runny magma, so significant pressures do not build up and gases escape easily to the atmosphere. Lava flows and small magnitude explosions are typically produced. Significant eruptions of this type can emit large volumes of gases and aerosols into the atmosphere over months or years.

3.33 The Laki eruption from Grimsvötn volcano in Iceland is the best understood large magnitude eruption of this type on which we have data. In 1783–84 Grimsvötn erupted along 17km of fissures (Laki).

Analysis of the geological and historical data about this eruption indicates that significant levels of sulphur dioxide, chlorine and fluorine were released over a number of months causing visible pollution across the UK and Northern Europe which is thought to have resulted in mass crop failure and thousands of excess deaths. (At least 20% of the population of Iceland succumbed to famine and disease.)

3.34 This research and ongoing modelling have been used to estimate the expected modern-day impacts of a similar event. It is anticipated that an eruption of this scale and type could have significant public health impacts both on the ground and for aircraft passengers. These public health impacts would be most severe for aircraft passengers because at this height sulphur dioxide concentrations would be potentially toxic. Consequently, widespread airspace closures on a significantly bigger and more prolonged scale than those experienced in April 2010 would be expected.

3.35 Higher than expected sulphur dioxide concentrations and deposits of chemicals emitted by the volcano could also have significant environmental impacts, especially for sensitive environments.

Planning by the Government, the devolved administrations and the emergency responders

3.36 The International Civil Aviation Organization has an established International Airways Volcano Watch consisting of nine Volcanic Ash Advisory Centres (VAACs) located around the

world which each have responsibility for coordinating and disseminating information on volcanic ash that might endanger aircraft. The London VAAC, run by the Met Office, has responsibility for monitoring Iceland, the UK and the north-east area of the North Atlantic.

3.37 Under the auspices of the World Meteorological Organization, the Met Office is also one of eight globally specialised centres for modelling the dispersal of particles (including ash) in the atmosphere. Such models allow evidence-based judgements to be made to determine whether it is safe to fly and passenger safety to be protected.

3.38 Following the volcanic ash disruptions in 2010 significant work has been undertaken to better monitor volcanic hazards and understand the impacts that explosive and effusive eruptions would have. This includes building stronger relations with relevant international organisations and the establishment of networks of experts on volcanic hazards more widely. Work continues within central government to better understand, and plan – in a proportionate way – for the expected impacts of all types of eruption.

Further information

Iceland Met Office
http://en.vedur.is/

British Geological Survey
http://bgs.ac.uk/

Global Volcanism Program
www.volcano.si.edu/index.cfm

International Volcanic Health Hazard Network
www.ivhhn.org/

Severe space weather

Risk

3.39   Weather on Earth, such as wind, snow and rain, has different terrestrial impacts and different meteorological causes. Similarly, space weather, including geomagnetic storms, radiation storms and solar radio noise, has different terrestrial impacts and is the result of different types of solar phenomenon, including coronal mass ejections (CMEs), solar energetic particle events, solar flares and solar radio bursts affecting the Earth. Current understanding is that a severe space weather event could have impacts on a range of technologies and infrastructure, including power networks, satellite services, transport and digital control components.

Background

3.40   Solar activity is cyclical, waxing and waning with an average period of approximately 11 years. The last maximum occurred in 2000 while the next is forecast to occur around May 2013.

3.41   The Carrington Event in 1859 is described as the perfect storm because the largest CMEs, radiation storms and solar flares ever recorded happened during this period.

3.42   Other significant space weather events have been recorded since then. A space weather storm in 1989 had considerable impacts on terrestrial infrastructure, most notably tripping the equipment protection systems of the Hydro-Québec electricity network, resulting in loss of power for nine hours across the Canadian province. A solar storm in 2003 interrupted the operation of satellites and caused the GPS augmentation system used by the aviation sector to go offline for around a day. Records from solar storms in 1921 and 1960 describe widespread radio disruption and impacts on railway signalling and switching systems.

3.43   While storm impacts in the early-to-mid 20th century appear relatively benign, dependency on technology vulnerable to space weather has pervaded most aspects of modern life and therefore the disruptive consequences of a severe solar storm could be significant.

Power networks

3.44   Severe geomagnetic storms caused by a fast-moving CME can generate large geomagnetically induced currents (GICs) through long, electrically conducting systems such as power grids, pipelines and signalling circuits. High levels of GICs can damage transmission, distribution and generation equipment in electricity networks, potentially leading to power failure.

Satellite services

3.45   Severe space weather can interrupt satellite services including global navigation satellite systems, communications, and Earth observation and imaging systems by damaging the space-based hardware, distorting the satellite signal, or increasing the errors in ground-based receivers.

Aviation

3.46 Airlines rely on high-frequency radio and satellites to maintain communications, both of which can be disrupted by space weather. Cosmic rays and energetic particles from solar radiation storms can adversely affect electronic control components in aircraft.

Digital control systems

3.47 High levels of energetic particles produced in the atmosphere by solar radiation storms can greatly enhance error rates in ground digital components found in all modern technology.

Planning by the Government, the devolved administrations and the emergency responders

3.48 Government has worked together with space weather scientists and engineers as well as industry and asset owners from the communications, transport and energy sectors to assess the risk of a severe space weather event of a similar scale to the Carrington Event of 1859.

3.49 However, space weather science is a relatively young field and its impacts on modern society are only recently coming to the fore as our dependence on technologies vulnerable to solar phenomena increases. Therefore significant work is continuing to better understand and plan – in a proportionate way – for the expected impacts of a severe space weather event. In particular, the Department of Energy and Climate Change, National Grid and others in the energy sector are working closely together to clarify the potential impacts of a severe event on electricity assets and networks.

3.50 Where relevant, the lead government department for each of the nine infrastructure sectors[5] is considering the resilience of their sector to space weather as part of their annual sector resilience plans. These plans are coordinated by the Cabinet Office and aim to set out the Government's understanding of the resilience of infrastructure to natural hazards. A public summary of these plans was published in spring 2011.[6]

Further information

Rutherford Appleton Laboratory
www.stfc.ac.uk/RALSpace/default.aspx

British Geological Survey
www.bgs.ac.uk/

British Antarctic Survey
www.bas.ac.uk/

Met Office
www.metoffice.gov.uk/research/areas/data assimilation and ensembles/space weather

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[5] Energy, communications, water, transport, health, emergency services, government, food and finance.

[6] www.cabinetoffice.gov.uk/infrastructure-resilience

Severe weather

Risk

3.51 As experience has shown, severe weather can take a variety of forms and at times can cause significant problems and disruption to normal life. Over the coming years we are likely to see rising temperatures and sea levels and an increase in the frequency and severity of extreme weather events in the UK. There are many types of severe weather, such as dense fog, which can have a serious local impact in a specific area and some of these are outlined in Community Risk Registers by Local Resilience Forums (which can be accessed via www.cabinetoffice.gov.uk/content/local-resilience-forums). However, since they do not have a national impact, they are not covered here. The main types of severe weather that we need to plan for at national level include storms and gales, low temperatures and heavy snow, heatwaves and drought.

Background

Storms and gales

3.52 The most significant storms in recent decades were those of 16 October 1987 and 25 January 1990. The first brought down an estimated 15 million trees in the south-east of England. As the peak wind speeds occurred overnight, there were fewer deaths and injuries than there might have been, given that the storm crossed such a densely populated area.

3.53 By contrast, the 1990 storm which occurred during the daytime was more extensive and had higher peak wind speeds. The more northerly track meant that the storm crossed areas that were on the whole less wooded than those affected by the 1987 storm. The net effect was a much higher death toll but less damage to trees and property.

3.54 More recently, a storm battered many parts of the UK on 18 January 2007, with gusts of wind up to 77mph recorded at Heathrow. This caused nine deaths and widespread damage to trees and buildings across the UK, along with power disruption.

Low temperatures and heavy snow

3.55 There have been a number of recorded occasions of snow covering large areas of the country for over a week.

3.56 The winter of 2009–10 saw a prolonged spell of cold weather that lasted for approximately a month between mid-December and mid-January. During this time snow fell widely and sometimes heavily across the UK, with notable falls of up to 40cm recorded in parts of north-west England and south and east Scotland. Many other areas experienced snow cover of 10cm or more throughout this period.

3.57 In Northern Ireland in February 2001 strong north-easterly winds and heavy snow caused travel disruption for up to five days and brought down power lines (resulting in power cuts to 70,000 homes), mostly in Counties Antrim and Down.

3.58 Less recently, more severe events include periods of snow in 1947 and also in 1962–63, which was the coldest winter in over 250 years. As the climate continues to change, the frequency of more extreme weather events is likely to increase although winters are expected to become milder and wetter on average. Extreme snowfall events may become less frequent in southern Britain in the future.

Heatwaves

3.59 Temperatures of 32°C or more (the threshold used by the Met Office to define a heatwave) were widespread during August 1990, having been recorded in virtually all parts of England and some parts of Wales. 1976 and 1911 were the only other occasions in which half or more of England experienced 32°C. In terms of persistence, 1976 ranks the highest with 32°C being exceeded at one or more places in the UK on 15 consecutive days from 23 June to 7 July.

3.60 The hot summer of 2003 is estimated to have resulted in 2,045 excess deaths (that is deaths that occur above what we would expect for that time of year), mainly among vulnerable populations. Since then, the Heat-Health Watch system[7] has been introduced, and during the hot weather of July 2006 significantly fewer (680) excess deaths were recorded. The Department of Health has set up specific heatwave advice.[8]

3.61 Consequences of heatwaves can be:

- an increased number of admissions to hospital and consultations with GPs, due to sunburn, heat exhaustion, respiratory problems and other illnesses such as food poisoning. This excess demand on the health service may cause the cancellation of elective surgery and routine procedures

- more vehicle breakdowns, due to overheating engines

- disruption to travel and logistics, due to deterioration of road surfaces.

Drought

3.62 Droughts are regular events and vary in intensity and duration across the country. A drought does not arrive without warning. Routine monitoring of drought indicators such as river or groundwater sites by the Environment Agency in England and Wales, the Northern Ireland Environment Agency and the Scottish Environment Protection Agency picks up indications of any significant deficits developing.

3.63 Periodic restrictions on non-essential water use are an integral part of water resource planning by water companies. The 2004–06 droughts in the south-east of England were similar in severity to the worst droughts of the last 200 years, where nine droughts of similar severity have been recorded. However, their impact extended only as far as the inconvenience for domestic customers of hosepipe bans and restrictions by one company on further non-essential uses under drought

[7] www.metoffice.gov.uk/weather/uk/heathealth/

[8] www.dh.gov.uk/en/publicationsandstatistics/Publications/ PublicationsPolicyAndGuidance/DH_099015

order powers, and then not to the full extent possible.

3.64 Climate change may produce more droughts but not necessarily a more frequent use of restrictions. Water resource and drought planning is dynamic to meet the challenges.

3.65 The Environment Agency in England and Wales provides an example of the work done in the UK to monitor, report and act to reduce the impact of drought on the environment. It has drought plans for all of England and Wales. These set out how it will manage water resources during a drought. These plans aim to balance the competing interests of the environment and the need for public water supply. They contain a range of environmental indicators that determine the action it will take to achieve this aim. Actions to manage drought include increased environmental monitoring, liaising with water companies, public awareness campaigns and assessments of drought permits and orders.

Planning by the Government, the devolved administrations and the emergency responders

3.66 The Met Office has responsibility for providing weather warnings for the UK. Advisory messages are issued routinely on the Met Office website, using a traffic-light system that indicates how confident we can be that severe or extreme weather is due.

3.67 Early warnings of severe or extreme weather are issued when the Met Office has 60% or greater confidence that severe weather is expected in the next few days. Flash warnings of severe or extreme weather are issued when the Met Office has 80% or greater confidence that severe weather is expected in the next few hours.

3.68 The Heat-Health Watch system operates in England and Wales between 1 June and 15 September each year in association with the Department of Health and the Welsh Government. The system comprises four levels of response, based on threshold maximum daytime and minimum night-time temperatures. These thresholds vary by region, but an average threshold temperature is 30°C by day and 15°C overnight.

3.69 Water companies' statutory drought plans have trigger points to initiate a range of actions during the various stages of a drought in order to manage supplies and demand. Only Emergency Drought Orders (EDOs) can authorise supply interruptions through standpipes or rota cuts. EDO powers have only been exercised three times in England and Wales since 1945 and not since 1976 when they were used in north Devon and south-east Wales.

Further information

Met Office website for up to date weather warnings
www.metoffice.gov.uk

Advice on what to do when severe weather is forecast
www.metoffice.gov.uk/weather/uk/advice/index.html

Heat Health Watch
www.metoffice.gov.uk/weather/uk/heathealth/

Information on water restrictions and what to do in a drought
www.environment agency.gov.uk/homeandleisure/drought/

Department for Environment, Food and Rural Affairs
www.defra.gov.uk/corporate/about/how/emergenc/

Scottish Government

www.readyscotland.org/are you ready/winter weather

Scottish Environment Protection Agency
www.sepa.org.uk

Northern Ireland Executive
www.doeni.gov.uk/index/protect_the_environment/water.htm

Animal disease

Risk

3.70   There have been a number of cases of significant animal disease in the UK in recent years with foot and mouth disease (2007) and avian influenza (bird flu) (last case in 2008) being the most notable examples. When considering the likelihood of such outbreaks, scale should be taken into account. Recent experience is of more frequent but smaller-scale outbreaks and large national outbreaks represented in the matrix (figure 2) in chapter 2 are less frequent.

Background

Non-zoonotic notifiable animal diseases (e.g. foot and mouth disease)

3.71   Non-zoonotic diseases are those that are not generally considered to be transmitted to humans. Swift action is still needed, however, in order to contain the spread of certain listed or notifiable diseases. As well as foot and mouth disease, other examples are classical swine fever, bluetongue and equine infectious anaemia, of which there were two cases in 2010.

3.72   Foot and mouth disease is spread very rapidly through both direct and indirect contact and can be windborne. The Government's policy is to contain disease where it is detected through humane culling of susceptible animals on infected premises and contacts where risk of exposure is very high. In addition, strict controls on movements of susceptible

animals and biosecurity are applied. Vaccination is considered from the outset of any foot and mouth disease outbreak, but does not replace the culling policy. Measures for reducing the risk of introduction include effective control of imports of meat, other animal products and susceptible animals.

3.73   There are two main forms of swine fever: classical swine fever, which has been recorded in the UK, and African swine fever, which has not. Although caused by different viruses, both are very contagious diseases of pigs and the measures for control and restriction are similar to those for foot and mouth disease.

3.74   Bluetongue was recorded in the UK for the first time in 2007. The disease is spread between susceptible animals by infected midges. Sheep are most severely affected by the disease. Measures to reduce the risk of introduction include controls on imports of cattle and sheep. Following a vaccination campaign the UK is now disease free.

Zoonotic notifiable animal diseases (e.g. highly pathogenic avian influenza)

3.75   Zoonotic notifiable animal diseases are those diseases that can be transmitted naturally between vertebrate animals and humans. They are named in Section 88 of the Animal Health Act 1981 or in an order made under that Act. The ease with which zoonotic disease transmission occurs varies by disease: for highly pathogenic avian influenza (H5N1 – influenza virus), for example, it is relatively uncommon

and requires specific circumstances. Only intense exposure of a person to birds that are infected with highly pathogenic avian influenza is likely to allow transmission of this disease to humans.

3.76 Highly pathogenic avian influenza has been recorded in poultry in the UK several times, most recently in 2008. Migratory wild birds can spread and introduce it by direct and indirect contact. It can also be introduced by mechanical transmission which is physically carried by infected material. For disease in poultry, the control measures include culling of birds on infected premises. There is no policy to cull wild birds. Vaccination has not been used as a control option given the success of other means of eliminating the disease.

3.77 West Nile virus is a viral infection mainly of birds, horses and humans, which is spread by the bite of infected mosquitoes and can cause encephalitis (inflammation of the brain) or meningitis (inflammation of the lining of the brain and spinal cord). Infection by West Nile virus has never been acquired by horses or humans in the UK. The virus has historically occurred in Africa, mainland Europe, the Middle East, West and Central Asia and in the USA for the first time in 1999 where it is now endemic.

3.78 Rabies is a fatal viral disease of the nervous system which can affect all mammals including humans. The disease is usually spread by saliva from the bite of an infected animal. Classical rabies has long been eradicated from the UK. Controls on the import of susceptible animals, including the pet travel scheme, help to

protect against infected animals entering the UK. A different type of rabies virus is present at a very low level in some UK bat populations. The risk of a human case of rabies in the UK is very low given the lack of contact between the majority of the public and bats.

Planning by the Government, the devolved administrations and emergency responders

3.79 The UK Government works to provide effective guidance to prevent an outbreak of animal disease occurring in the first place, but it also seeks to predict local and global trends in order to prepare effectively. This includes:

- monitoring disease outbreaks around the world, and reporting on the latest developments and changes in risks

- working with private veterinary surgeons, industry stakeholders, animal keepers and operational partners at national and local level to provide warnings and rapid detection of UK disease threats, as well as advice and guidance through a range of media.

Further information

For animal health and welfare
www.defra.gov.uk/foodfarm/index.htm
www.dardni.gov.uk/index/animal health.htm
www.scotland.gov.uk/Topics/farmingrural/
Agriculture/animal welfare

For health issues relating to zoonotic diseases
www.hpa.org.uk
www.publichealth.hscni.net

For food safety advice
www.food.gov.uk

Major accidents

Major industrial accidents

Risk

3.80 Much has been done in the UK both to help to prevent industrial accidents and to minimise their effects, but they can still occur. Industrial accidents can take a wide variety of forms and consequently their impacts can vary considerably in both scale and nature. In most cases they will have no or very limited impact outside the industrial plant and can be dealt with locally. But, as the examples from around the world detailed below show, in rare cases it is possible for there to be more significant consequences.

Background

Fires

3.81 Fire can either be a risk in its own right or because of the damage that it can cause. For example:

- On 14 November 1990, a fire in a telephone exchange led to the failure of all lines in the Scarborough area, including those of the coastguard, other emergency responders and the public utilities. Some cash dispensers and computer systems linked to the telephone network also failed.

- In December 2005, the largest peacetime fire in Europe occurred at the Buncefield Oil Storage Terminal in Hemel Hempstead. There were no deaths but a number of injuries. In the short term, the surrounding area was evacuated. Some businesses in the immediate vicinity as well as the site itself experienced much longer-term disruption to operations.

Contamination

3.82 Contamination can take many forms. While there are extensive arrangements in place to prevent and detect any contamination before it reaches the general public, accidents can still occur. Some of the more extreme examples drawn from around the world are detailed below:

- In February 2005, over 650 products were taken off the shelves in UK supermarkets due to concerns over the contamination of food products with Sudan 1 (a colouring agent used in the food industry).

- In 1997 in Scotland and 2006 in England, water supply areas were accidentally contaminated with diesel. The event in February 2006 affected 2,500 properties in the Exeter area. The water company enacted emergency procedures and distributed alternative supplies of drinking water while the incident was investigated and resolved. The Drinking Water Inspectorate[9] conducted an assessment and made recommendations and suggestions for measures to mitigate against a repeat of such incidents.

- In 1976, an accident occurred at a chemical plant manufacturing pesticides and herbicides in Seveso, Italy. This led to the release of poisonous and carcinogenic dioxins into the air. The contamination

[9] http://dwi.defra.gov.uk

affected 25km² of land and vegetation. More than 600 people had to be evacuated from their homes and as many as 2,000 were treated for dioxin poisoning.

- In September 1987, a lead canister containing caesium-137 (a radioactive isotope) ruptured in Goiânia, central Brazil. The contamination was spread by human contact, wind and rainwater run-off and resulted in four deaths from exposure and contamination of 244 people, seven major properties and 42 residences.

3.83 In some cases an accident may have large impacts on local wildlife and the surrounding environment. For example:

- In 1996, the crude oil tanker *Sea Empress* ran aground off south-west Wales, spilling approximately 72,000 tonnes of oil into the sea. In 2007, the MSC *Napoli* was beached in Lyme Bay after suffering serious structural failure. A small amount of oil leaked into the sea, and some cargo washed ashore on nearby beaches. In March 2008, the *Ice Prince* sank off the Devon coast, shedding around 2,000 tonnes of timber, much of which subsequently washed up on beaches along the south coast.

Technical failure

3.84 Probably the most extreme scenario, but one of the least likely, in this section is the nationwide loss of electricity. The high-voltage electricity transmission network in Great Britain has never experienced a complete shutdown in its history. Nevertheless, because of our reliance

on electricity for so many aspects of our lives, even localised losses of electricity can have a significant impact on those affected. A loss of gas supply could also be significant for those who rely on gas for heating and cooking. For example:

- On 27 October 2002, a storm swept across England and Wales which resulted in interrupted electricity supplies to 2 million customers. Most were reconnected within two days, but a very small percentage were disconnected for up to 10 days.

- A major accident at a gas processing facility on 25 September 1998 severely disrupted gas supplies to the State of Victoria in Australia. Householders lost their gas supplies for heating, cooking and hot water, as did hotels and restaurants. Industry that used gas had to close and their suppliers lost business due to the decreased demand. Gas supplies were restored to major users on 5 October and to householders in the following days.

3.85 Other examples of technical failure include the following:

- In April 2007, a major pumping component at a waste water treatment plant serving 800,000 people in Edinburgh failed, causing 1,000 litres a second of partially diluted untreated sewage to be pumped into the Firth of Forth.

- The Malpasset dam on the Reyran River in southern France was breached on 2 December 1959. The breach created a wall of floodwater 40m high, moving at 70km/h. It destroyed two small villages and, in 20 minutes, reached Fréjus, 7km to

the south, where it was still 3m high. The resulting flood killed over 400 people and caused widespread damage.

Planning by the Government, the devolved administrations and the emergency responders

3.86 The Government, the devolved administrations, industry, regulators and emergency responders work closely together to reduce the chance of any incident occurring.

3.87 Following the Seveso incident detailed above, there were major changes to European law, which is now regularly reviewed. The current legislation is The Control of Major Accident Hazards Regulations 1999 (COMAH) and Control of Major Accident Hazards Regulations (Northern Ireland) 2000 under which major hazard sites are regulated and inspected in accordance with the regulations. Their main aim is to prevent and mitigate the effects of major accidents involving dangerous substances.[10]

3.88 Following the accident at the nuclear power plant at Chernobyl in 1986, the Government prepared a National Response Plan for dealing with the effects of overseas nuclear accidents on the UK population and infrastructure[11] and set up the Radioactive Incident Monitoring Network (RIMNET). The RIMNET system is a network of 96 monitoring stations around the UK which hourly measures radioactivity dose levels in the UK and is designed to deliver coordination of consequence management and the authoritative central scientific response to any overseas incident.

3.89 The UK Government has also worked to reduce the opportunity for any accident involving radioactive sources to occur, such as the Goiânia incident. The High-activity Sealed Radioactive Sources and Orphan Sources Regulations 2005 (HASS) mean that sources are constantly tracked, and 6,000 surplus sources have been removed from circulation by a UK-wide initiative.

3.90 In the event that an industrial accident involving hazardous materials does take place, there is a well developed capability among the emergency responders to deal with it. The emergency responders receive specialist training and are provided with protective equipment and the relevant supplies to enable them to operate in hazardous environments and to rescue and treat any casualties. Both the Ambulance and Fire and Rescue Services have means to decontaminate people affected by such an incident and local authorities have plans in place to open reception centres for those caught up in the incident or displaced from their homes. Where necessary, decontamination of the area of any incident can be undertaken by contractors drawn from a framework established by the Government Decontamination Service[12] so that it can be returned to normal use.

[10] www.hse.gov.uk/comah

[11] www.defra.gov.uk/corporate/about/what/contingency/topics/environment.htm

[12] www.fera.defra.gov.uk/environment/government DecontaminationService/index.cfm

3.91 The response to any incident involving hazardous materials, whether accidental or deliberate, requires a well coordinated multi-agency response. Accordingly, there is planning for such events at national and local level and regular testing of the plans through exercises.

Sector-specific planning

Electricity

3.92 There are comprehensive plans in place for handling a complete national outage as well as outages in a number of local areas. In the event of a national outage (which has never occurred), and provided that there had been no damage to the system, the objective would be to restore supplies throughout Great Britain within three to five days.

Water and sewerage

3.93 The Security and Emergency Measures (Water and Sewerage Undertakers) Direction of 1998 places a series of statutory requirements on water companies in England and Wales (the Security and Emergency Measures Direction 2002 applies in Scotland) in relation to their emergency planning functions. All water companies have plans in place to provide alternative water supplies as well as trained and experienced personnel and suitably equipped permanent or mobile accommodation to act as command and control centres.

3.94 Where piped mains water cannot be used, supplies of drinking water that meet the

prescribed standard are required. These may be provided from other parts of the company's network not affected by the emergency, or from neighbouring companies. They may be supplied to customers in bowsers or bottles.

Gas

3.95 All network gas companies have plans and arrangements in place to respond in the event of a disruption to gas supplies. Beyond this, comprehensive plans are in place, underpinned by safety regulations, to do everything practicable to maintain gas supplies to domestic customers in the event of a significant disruption to gas supplies.

Telecommunications

3.96 Telecommunications are a vital utility underpinning economic and social endeavour. In recognition of the importance that information and communications technologies have the Government has published a new Cyber Security Strategy (25 November 2011).

3.97 Telecommunications are highly commoditised and largely very reliable. However, this means that a significant service disruption can result in disproportionate consequences. While core telecommunications networks are very resilient to disruption, access networks that connect consumers to core networks are more fragile. Organisations and individuals with critical communications requirements are encouraged to review the resilience of

their arrangements and take appropriate enhancing measures – the Cabinet Office provides guidance at www.cabinetoffice.gov.uk/content/resilient-communications.

3.98 From time to time, significant disruptions to services occur. As a consequence of the highly networked nature of telecommunications infrastructures, problems experienced on one network can affect other operators. The Electronic Communications, Resilience and Response Group is an industry-run group of telecommunications companies hosted by the Department for Business, Innovation and Skills which acts to raise awareness of telecommunications resilience and facilitates a response to major incidents through the NEAT (National Emergency Alert for Telecommunications) protocol.

3.99 Over time, national telecommunications resilience is set to increase as Ofcom gains a more complete understanding of the health of networks through operators reporting system outages under the requirements of Section 105 (amended, May 2011) of the Communications Act 2003 and the requirements of the Digital Economy Act 2010.

Fuel

3.100 The Government's National Emergency Plan for Fuel is designed to prioritise fuel resources in the event of major disruption to supply. It includes the possibility of rationing supply to retail customers, and prioritising emergency responders and essential service providers. If there is sufficient diesel to supply emergency responders and essential service providers then the surplus will be prioritised to truck stops and HGV motorway filling stations to help to keep supply chains operational.

Marine pollution

3.101 The Maritime and Coastguard Agency has well practised plans that include all the relevant emergency responders for both major and minor pollution incidents and procedures for handling vessels that are involved in accidents.

Planning for dam inundation

3.102 The Environment Agency enforces the Reservoirs Act 1975 which applies to more than 2,000 reservoirs in England and Wales. It is responsible for maintaining a register of these reservoirs and achieving compliance with the Act. In Scotland, local authorities enforce the Reservoirs Act which applies to over 650 reservoirs.

3.103 Subsequent to the severe flooding of recent years and Sir Michael Pitt's review of the 2007 floods, the Environment Agency mapped the extent of the 'worst credible case' potential flood zone for each of the 2,000 or so English and Welsh reservoirs

regulated under the Act. The maps are now available to emergency planners, reservoir owners and managers, and local responders and others to enable them to put plans in place to deal with any potential reservoir failure.

3.104 From summer 2010 it has been possible to view whether an address in England and Wales is in an indicated flood zone for a reservoir by searching a flood map on the Environment Agency's 'What's in your backyard?' website.

Further information

Government Decontamination Service
www.fera.defra.gov.uk/environment/
governmentDecontaminationService/index.cfm

The Government's National Emergency Plan for Fuel
www.og.decc.gov.uk/downstream/
emergencies/down_emerge.htm

Maritime and Coastguard Agency's National Contingency Plan for Maritime Pollution
www.dft.gov.uk/mca

Radioactive Incident Monitoring Network (RIMNET)
http://archive.defra.gov.uk/evidence/statistics/
environment/radioact/radrimnet.htm

Control of Major Accident Hazards (COMAH)
www.hse.gov.uk/comah/

Major transport accidents

Risk

3.105 Transport accidents occur across the UK on a daily basis, mainly involving private vehicles on roads, and well practised plans are in place to deal with these at the local level. This section focuses on those rare major transport accidents which have such a significant impact that they require some form of national response. Thanks to modern safety regimes, large-scale transport accidents are very rare; nevertheless, they cannot be entirely ruled out as the following examples demonstrate.

Background

Air

3.106 There have not been any major air accidents in the UK since the Kegworth incident in 1989 when a Boeing 737 crashed close to the M1 motorway, resulting in the death of 47 passengers with no loss of life on the ground. A more recent incident was the loss of power to a Boeing 777 on approach to Heathrow in January 2008; this emergency landing caused one serious injury and no deaths.

Maritime

3.107 The last major accident involving a UK-flagged ship was the sinking of the *Herald of Free Enterprise* in March 1987. The ferry capsized shortly after leaving Zeebrugge en route to Dover, resulting in over 185

deaths. The sinking of the *Estonia* in the Baltic Sea in 1994, which led to more than 850 deaths, also demonstrates the potential for loss of life on a massive scale when flooding of a vessel occurs.

3.108 In December 2002, the *Tricolore* was hit by a container ship in French waters in the English Channel and sank. The hazard that this created in the Channel resulted in some disruption to shipping.

Road and rail

3.109 While accidents do occur much more frequently on the UK's road network than on other forms of transport, the scale of even the largest such incident would not be sufficient to warrant a coordinated central government response. Similarly, continuing improvements to rail safety regimes and infrastructure over recent years have led to a substantial reduction in both the frequency and impact of rail accidents. As with road accidents, it is highly unlikely that an incident of this kind would require a coordinated central government response.

Planning by the Government, the devolved administrations and the emergency responders

3.110 Individual public transport sectors are, mostly, subject to regulation of their provision of services. All transport sector operators have contingency plans that cover a range of possible outcomes in the event of an accident, including those most likely to create a wider impact. These plans include the diversion of resources where

possible (based on safety and operational requirements) to ensure that some form of public transportation is available.

3.111 The response by the emergency responders to such events is covered by their existing arrangements for responding to other types of major incidents.

Further information

Department for Transport
www.dft.gov.uk

Civil Aviation Authority
www.caa.co.uk

Transport Scotland
www.transportscotland.gov.uk

Traveline Scotland
www.travelinescotland.com

Traffic Scotland
www.trafficscotland.org

Northern Ireland Public Transport
www.translink.co.uk
www.drdni.gov.uk/index/public_transport.htm

Disruptive industrial action

Risk

3.112 Industrial action typically occurs when members of a trade union are involved in a dispute with their employer that cannot be resolved by negotiation. Workers will usually take industrial action by either refusing to work altogether (strike) or refusing to work in the way their employment contract says. The UK has experienced a number of industrial disputes over recent months.

3.113 The Government and devolved administrations monitor the frequency and potential impact of industrial disputes, only acting as a mediator in exceptional circumstances. The Government assesses that the industrial relations climate is likely to remain unpredictable over the coming months given the budget deficit, the requirement for organisations to deliver significant savings and employees' concerns over their pay, conditions, job security and pensions.

Background

Industrial action

3.114 In recent years, there have been a number of industrial disputes which have caused disruption across the UK. The majority of this industrial action and activity at picket lines has been peaceful.

3.115 For example, in 2002–03 members of the Fire Brigades Union held a number of strikes over pay. Over this period, the armed forces were drafted in to provide essential fire fighting and rescue capability.

3.116 More recently, on 30 November 2011, coordinated strike action across several public sector unions took place.

Planning by the Government, the devolved administrations and the emergency responders

3.117 Industrial action has the potential to cause disruption to services essential to the public. Individual industrial/infrastructural sectors (for example utility companies) have plans in place to maintain business continuity in the event of disruption by industrial action. For example, each fire and rescue service has well prepared contingency plans.

3.118 Industrial action, and any concurrent protests, also have the potential to pose significant public order challenges and place considerable demand on police resources. The Government, the police and the devolved administrations work together closely to monitor the threat of strike action, to manage the situation, and to mitigate the effects of strike action on the wider UK infrastructure where possible.

Public disorder

Risk

3.119 Public disorder can manifest itself in many ways, all of which challenge law enforcers, and can include rioting, looting, vandalism, violence and arson. It often occurs following a trigger event which causes an eruption of violence. This unrest may then provoke further disorder, often unrelated to the initial trigger. In some cases sporadic copycat activity may be facilitated by the use of social networking.

3.120 A key characteristic of this type of civil unrest is its unpredictable nature. A vast array of incidents may occur on a daily basis, all of which have the potential to elicit civil unrest. However, only a tiny minority of these events will lead to public disorder. There are several factors which may affect the likelihood of public unrest erupting: for example, it may be more likely in communities where underlying issues and frictions are already present. Other social, economic and environmental factors may be behind violence, but it can fall to one single incident to push these grievances towards violent clashes.

Background

3.121 Over recent years, public unrest has occurred both in the UK and abroad. In the UK, for example:

- On 6 August 2011 a public protest in Tottenham quickly escalated into widespread violent disorder. Over four days, violence unrelated to the initial

trigger spread first in London and then to Manchester, Salford, the West Midlands and a number of other towns and cities across England. The disorder varied in character from area to area but included violence directed at police officers, damage to property and extensive looting.

- In April 2011 police in Bristol entered a local squat to conduct an arrest. Tensions in the area were already heightened owing to the recent opening of a supermarket which had caused controversy among local groups and residents. Following the arrest, a public order incident rapidly developed with approximately 200 people clashing with police over the following hours.

3.122 Public unrest of a more severe nature was seen in France in October and November 2005. This was triggered by the death of two teenagers in a suburb of Paris. The violence spread across Paris and many other cities in France. This disorder resulted in two deaths and over 100 casualties among police and the rioters. Much damage to buildings was caused by arson and thousands of vehicles were burnt.

Planning by the Government, the devolved administrations and the emergency responders

3.123 Widespread civil unrest on the scale of that experienced in August 2011 has been rare in the UK. However, when it does occur, the speed of events and the broad range of possible triggers which cause public unrest make these incidents very difficult to predict.

3.124 In the UK, civil protection arrangements are designed to be flexible and scalable, able to adapt to any circumstances. For example, when a public order incident has the potential to overwhelm the capacity of one police force, the Association of Chief Police Officers (ACPO) coordinates the strategic policing response. This is facilitated through the ACPO Police National Information Coordination Centre (PNICC). PNICC works to ensure policing resilience during major events.

3.125 The UK is always looking to improve its ability to respond to public disorder. To this end, following the August 2011 disorders, the Home Secretary asked HM Chief Inspector of Constabulary to review how forces could increase preparedness and promote a more effective use of intelligence and tactics. In addition, research is being conducted by police forces, across government and by social policy groups to examine the causes, events and responses to the August disorders. This research will give a valuable insight across key areas to inform government thinking on prevention of future episodes of disorder.

Malicious attacks

3.126 As the 2010 National Security Strategy, *A Strong Britain in an Age of Uncertainty*, outlined, the UK faces a serious and sustained threat from terrorism. At the time of publication, the national threat assessment stands at 'substantial', having been reduced from 'severe' in July 2011.

3.127 The Intelligence and Security Committee's Annual Report to Parliament has shown that the past year has seen significant changes in the threat from international terrorism. Al Qaeda's leadership is now weaker than at any time since the 9/11 attacks. But Al Qaeda continues to pose a threat and groups affiliated to Al Qaeda in countries such as Yemen and Somalia have emerged as a threat in their own right. Many of those networks and individuals who have been judged to pose a terrorist threat continue to share an ambition to cause large numbers of casualties without warning. Some have aspirations to use unconventional weapons such as chemical, biological, radiological or nuclear substances. Others aspire to attack our national infrastructure using both traditional methods and more novel methods such as cyber attack.

3.128 The Government's updated counter-terrorism strategy, CONTEST (2011), is an integrated approach based on four main workstreams, each with a clear objective to reduce the risk to the UK from international terrorism. The *National Risk Register* is focused on preparing for emergencies and mitigating the impact of terrorist attacks

(the *Prepare* workstream of CONTEST), but has links with all the CONTEST workstreams outlined below:

- *Pursue:* stopping terrorist attacks

- *Prevent:* stopping people becoming terrorists or supporting terrorism

- *Protect:* strengthening our protection against a terrorist attack

- *Prepare:* where an attack cannot be stopped, mitigating its impact.

3.129 Under CONTEST, comprehensive plans have been developed to protect sites critical to the national infrastructure, crowded places such as sports venues and shopping centres, and the UK's borders. Thousands of emergency responders, workers and key officials have been trained and equipped to deal with a terrorist incident, including those involving chemical, biological and radiological weapons. This ensures that our response to an attack is as effective, coordinated and speedy as possible, so that the primary aim of saving life can be achieved as well as the effective management of the impact of such an attack, leading to a quicker return to normality.

3.130 As the 2010 National Security Strategy made clear, terrorism is not the only malicious threat we face. Organised crime has a significant impact on the daily lives of UK citizens; the Home Office estimates that some £20 billion a year of social and economic harms to the UK are attributable to serious organised crime. Crime types are evolving and criminals continue to

take advantage of new crime markets, technology and emerging opportunities around the world.

3.131 The National Security Strategy confirms that, while we cannot rule out the re-emergence of a major state-led threat, for the foreseeable future, no state will have both the intent and capability to threaten the independence, integrity and self-government of the UK mainland. Instead, states may seek to threaten the UK's stability and freedom to act using levers such as cyber attack, espionage or significant economic or trade pressure.

Further information

Security Service (MI5)
www.mi5.gov.uk

Serious Organised Crime Agency (SOCA)
www.soca.gov.uk

SOCA – UK Threat Assessment
www.soca.gov.uk/about soca/library/doc_ download/54-the united kingdom-threat assessment of organised crime.pdf

National Security Strategy
www.cabinetoffice.gov.uk/reports/national_ security.aspx

Attacks on crowded places

Risk

3.132 While there have been attacks against well protected targets around the world, crowded places remain an attractive target for a terrorist attack.

Background

3.133 Although the UK has faced a variety of terrorist threats in the past, Al Qaeda and related terrorist groups have shown a level of willingness to carry out indiscriminate terrorist attacks. Beach bars in Bali, hotels and restaurants in Egypt, rush hour trains in Madrid and armed assaults in Mumbai have offered terrorists the prospect of high-impact attacks with large numbers of casualties. Crowded places by their nature are easily accessible, have varying degrees of protective security and have the potential for substantial loss of life and wide-reaching consequences. Attacks are often carried out without warning.

Planning by the Government, the devolved administrations and the emergency responders

3.134 Long-standing and regularly tested major incident plans and structures are in place across government. The adaptability and expertise of the emergency responders provide a solid basis for handling a mass casualty incident. Our ability to deal with mass casualties has improved steadily, with more health responders having plans to provide additional capability and capacity.

The Ambulance Service's programme of introducing Hazardous Area Response Teams, which began in 2007–08, for example, is near completion. This provides training, equipment and vehicles for ambulance staff to enable them to work in hazardous areas. There is now a high level of engagement by local responders in major incident planning for fatalities and improved provision of capability at national level, under the Home Office-led mass fatalities programme.

3.135 A substantial amount of work has been undertaken over recent years to increase levels of protective security for crowded places. This has included awareness-raising initiatives and training on counter-terrorism protective security, as well as the development of a standard method of assessing the vulnerability of crowded places, enabling local areas to prioritise their work and assess progress. This work is led and quality assured by the National Counter Terrorism Security Office through its national network of police Counter Terrorism Security Advisers.

3.136 Guidance documents are available to help designers, architects, planners and others involved in the development of crowded places to incorporate proportionate protective security measures into new and pre-existing developments.

3.137 While attacks involving firearms are infrequent, it is important to be aware that such incidents could occur. Although generic response capabilities offer a sound basis for work to respond to a terrorist incident, attacks of the kind that took place

in Mumbai in November 2008 require a more specialised response. In the past two years, considerable resources have been devoted to developing more effective responses to a marauding firearms attack. While the programme of work continues, significant improvements have been made to police firearms resources and tactics, and we continue to improve joint working between the emergency services so that they can respond more effectively to this type of incident.

Further information

Scottish fire and rescue services
www.scotland.gov.uk/Topics/Justice/public safety/fire and rescue services

National Counter Terrorism Security Office
www.nactso.gov.uk/areaofrisks/ crowdedplaces.aspx

Home Office
www.homeoffice.gov.uk

Attacks on infrastructure

Risk

3.138 The national infrastructure comprises those facilities, systems, sites and networks necessary for the functioning of the country and the delivery of the essential services on which daily life in the UK depends. These fundamental services, such as electricity and water supply, ensure that the country continues to function socially and economically.

3.139 Many of the consequences of industrial accidents, technical failure or severe weather could also result from a terrorist attack on infrastructure. The risk and impact vary according to the importance of the infrastructure asset attacked.

3.140 Cyber attacks on infrastructure and attacks on transport systems are dealt with in subsequent sections.

Background

3.141 Terrorists in the UK have previously attacked, or planned to attack, national infrastructure. Attempts were made to attack electricity substations in the 1990s. Bishopsgate, in the City of London, was attacked in 1993 and South Quay in London's Docklands in 1996. These attacks resulted in widespread damage and disruption but relatively few casualties. Elsewhere in the world, terrorists have carried out attacks against energy infrastructure (in Algeria and Yemen in 2007 and 2008) and against financial institutions and government buildings (such as the attacks on the World Trade Center in 1993 and 2001).

Planning by the Government, the devolved administrations and the emergency responders

3.142 As with attacks on crowded places, long-standing and regularly activated major incident plans and structures are in place across government. Planning for the impacts of attacks on infrastructure is in many cases the same as for accidents or technical failure. The previous section on major industrial accidents outlines a range of these plans which, in addition to businesses' continuity plans for loss of essential services, should help to anticipate and minimise the effects of any disruptions.

3.143 A comprehensive and well established programme of work to protect the national infrastructure from terrorism and other national security threats is also in place, along with robust mechanisms to ensure an effective response by the range of government departments involved. The Centre for the Protection of National Infrastructure (CPNI) is the government authority that provides protective security advice to businesses and organisations across the national infrastructure. CPNI provides integrated advice on physical, information (including digital) and personnel security, aimed at minimising risk and reducing the vulnerability of the national infrastructure to terrorism, espionage and other threats.

Further information

Centre for the Protection of National Infrastructure
www.cpni.gov.uk

45

Attacks on transport systems

Risk

3.144 Of the different malicious attacks outlined in this document, conventional attacks on transport systems are judged to be some of the more likely to occur, although the likelihood of them affecting any one individual is still extremely low. This assessment is supported by the many examples of this type of attack perpetrated by different groups around the globe. As the recent incidents outlined below indicate, attacks on transport systems can take different forms with different levels of impact.

Background

Rail and underground

3.145 Stringent security measures are applied at airports. Rail and underground networks, however, are open systems, which makes them attractive potential targets and there have been several successful attacks on rail networks worldwide.

3.146 On 7 July 2005, London's transport system was attacked with four explosions (three on underground trains, one on a bus). This was followed by unsuccessful attacks two weeks later. There are also a number of examples in other countries of successful attacks against underground systems (Moscow, 2004) and mainline rail services (Madrid, 2004).

Air

3.147 Over the past 20 years there have been a number of attacks by terrorists against the aviation industry. These include the 1988 Pan Am flight blown up over Lockerbie, the deliberate use of hijacked planes to attack the World Trade Center and the Pentagon in September 2001, and the attempted attack using explosives concealed in shoes on a transatlantic flight in 2001. Despite this ongoing threat, the number of attacks has remained relatively small, due in part to the work of the police, security and transport safety authorities and to the development of appropriate security measures at airports. Operation Overt, the 2006 liquid bomb plot, which targeted multiple transatlantic airliners, demonstrated both the profile of commercial aviation as a terrorist target and the capacity of some terrorists to devise innovative methods to circumvent security.

3.148 A more recent example of this took place on 25 December 2009 when an attempt was made to detonate a device by a Nigerian citizen on a Northwest Airlines flight from Amsterdam to Detroit. The device used had clearly been constructed to make detection by existing screening methods extremely difficult. While there are a number of security screening methods in place, no technology can be 100% effective but it is clear that security scanners can help to detect devices such as the one used in this incident. It therefore makes sense that they be deployed as swiftly as possible to add to the capabilities

we already have for detecting possible threat items. Accordingly, security scanners have been introduced at three of the UK's largest airports, and a further roll-out of the technology has been announced.[13]

3.149 In October 2010, a plot to detonate explosive devices concealed in printer cartridges on cargo planes en route to the USA was disrupted. Following the incident, the UK reviewed and enhanced its cargo security processes, and worked with international partners to strengthen security measures and explosive detection capabilities at air cargo departure points around the world. An EU high-risk cargo regime which sets security screening standards for all in-bound cargo from the rest of the world has also been established.

Maritime

3.150 To date, no attack against maritime interests in the UK has been mounted by terrorists. The introduction of the International Ship and Port Facility Security Code has served to improve maritime security in the UK and this is likely to have a deterrent effect, although maritime attacks like those seen overseas (for example, the suicide bomb attack on the USS *Cole* when it was harboured in Aden in 2000 and the attack on the oil tanker *M.Star* in 2010) cannot be ruled out in the UK in the future.

Planning by the Government, the devolved administrations and the emergency responders

3.151 Individual public transport sectors are, mostly, subject to regulation of their provision of services. All transport sector operators have contingency plans that cover a range of possible scenarios including malicious attacks that are most likely to create a wider impact. Those plans include the diversion of resources where possible (based on safety and operational requirements) to ensure that some form of public transportation is available.

Rail and underground

3.152 These remain popular targets due to the large number of people who travel on these systems each day and the ease of access to them. Security for the national rail network, as well as for London Underground, the Docklands Light Railway and the Glasgow Subway, is regulated and monitored by the Department for Transport. As open networks, these systems will always be more vulnerable to attack than closed systems such as aviation. Both Network Rail and London Underground have robust plans in place to respond to emergencies and these are regularly tested and updated. The British Transport Police are responsible for policing British rail networks and are closely involved in contingency planning, as well as working with industry and the Department for Transport on security issues.

[13] www.dft.gov.uk/news/statements/greening-20111121

3.153 Eurostar services through the Channel Tunnel are subject to a more stringent security regime, similar to that which exists at airports, under which all passengers and their baggage are currently subject to screening.

Air

3.154 Stringent protective security measures exist at UK and EU member states' airports. Airlines and airports are required to carry out a range of specified measures to mitigate the risk of attack. These include the following:

- screening of passengers and their bags, as well as of all staff working in restricted areas

- physical security measures including the separation of incoming international passengers from all outbound travellers

- background checks on staff in sensitive posts.

3.155 Security measures are also in place to protect aircraft in flight, such as the compulsory locking of cockpit doors. These security regimes are regularly inspected by the Department for Transport (DfT) to ensure compliance. In addition, DfT provides advice to UK airlines operating overseas on measures needed at their foreign stations.

Maritime

3.156 Stringent protective security measures exist (including tightly controlled access) for cruise ships and ferries serving the UK. New rules for domestic ferries came into effect on 1 July 2007 as domestic sea-going ferries now fall within the scope of the EU regulation for enhancing ship and port facility security.

Further information

Department for Transport
www.dft.gov.uk/topics/security

Unconventional attacks

Risk and background

3.157 The events of 9/11 showed that mass impact terrorist events, while unlikely, cannot be ruled out. The likelihood of terrorists successfully undertaking an attack against a nuclear or chemical facility or obtaining chemical, biological, radiological or nuclear (CBRN) material remains low but is not negligible. The Government is prioritising efforts to stop terrorists gaining the capabilities to deliver such attacks. But if terrorist groups were successful, their potential impact on the UK would be severe and significantly greater than a conventional attack.

Smaller-scale CBR attacks

3.158 To date there have been relatively few examples of attacks perpetrated using chemical, biological or radiological (CBR) materials. The most significant include the chemical attack on the Tokyo underground system in 1995 perpetrated by Aum Shinrikyo and the sending of letters containing anthrax to government buildings in the USA in 2001.

3.159 The potential nature of the impact of an attack using CBR materials will depend on a range of factors, including the type and quantity of the CBR material used. CBR materials may be used on a small scale (assassination or poisoning) or as mass-impact weapons (widespread dispersion and contamination). Such attacks could take the form of release in an indoor or outdoor environment or contamination of food or water. Radiological materials could also be combined with explosives to produce a radiological dispersal device (a so-called 'dirty bomb') which would aim to spread radioactive material over a wide area.

Catastrophic terrorist attacks

3.160 Terrorists will often seek to undertake attacks which target our vulnerabilities and cause disproportionate impacts. While the likelihood of terrorists carrying out 9/11 'copycat'-style attacks or obtaining effective mass-impact biological agents or an improvised nuclear device remains low it is not negligible. Attacks of this type may be significantly more challenging than conventional attacks because of the nature of the potential health impacts resulting from the materials used and because they may result in widespread environmental contamination. Specialist responses may be needed and, in some cases, the clean-up process may be protracted as well as unfamiliar and untested.

Planning by the Government, the devolved administrations and the emergency responders

Smaller-scale CBR attacks

3.161 Effective, coordinated and speedy response to a CBR attack can save lives, and it is vital to manage the immediate impact of such an attack effectively. Over the past five years, the UK has concentrated much of its resource and funding on improving

the level of preparedness so that the emergency responders can act quickly and safely in what could be life-threatening situations.

3.162 There is a well developed capability among the emergency responders and other responder agencies to deal with smaller-scale CBR incidents, with planning and regular testing of plans at all levels to ensure an effective and integrated response. Emergency responders receive specialist training and are provided with protective equipment in order to enable them to operate in hazardous environments and to rescue and treat any casualties. Both the Ambulance and Fire and Rescue Services have the means to decontaminate people affected by such an incident and local authorities have plans in place to open reception centres for those caught up in the incident or displaced from their homes.

Catastrophic terrorist attacks

3.163 The UK Resilience Capabilities Programme, led by the Cabinet Office, is the core framework through which the Government seeks to build resilience across the UK to meet the generic consequences of a wide range of civil emergencies, including catastrophic impact attacks, such as 9/11-style attacks. In addition the Government continues to build capabilities to mitigate the impact of attacks involving a biological agent or improvised nuclear device. In particular, the focus is on those measures that would have the greatest impact on reducing deaths and illness.

3.164 This will include building stocks of antibiotics and agreeing emergency arrangements for their distribution; increasing the capacity of the NHS to provide supportive care in an incident; improving our ability to detect and monitor biological and radiological hazards; updating our operational response and evacuation plans to allow for the scale of these kinds of disaster; and making improvements to the communications plans to ensure that the public know what they can do to minimise the risk to them.

Further information

Government Decontamination Service
www.fera.defra.gov.uk/environment/governmentDecontaminationService/index.cfm

Home Office
www.homeoffice.gov.uk/counter terrorism

Cabinet Office
www.cabinetoffice.gov.uk/ukresilience

Cyber security

Risk

3.165 The internet has become central to our economy and our society. Increasing our reliance on cyber space brings new opportunities but also new threats. While cyber space fosters open markets and open societies, this very openness can also make us more vulnerable to those – criminals, hackers, foreign intelligence services – who want to harm us by compromising or damaging our critical data and systems.

3.166 The impacts of cyber attacks are felt in our economy, in our critical national infrastructure and in society.

3.167 The digital architecture on which we now rely was built to be efficient and interoperable. When use of the internet first started to grow, security was given less consideration. However, as we put more of our lives online, it matters more and more.

3.168 Unfortunately, a growing number of adversaries are looking to use cyber space to steal, compromise or destroy critical data. The scale of our dependence means that our prosperity, our key infrastructure, our places of work and our homes can all be affected.

Background

3.169 Criminals are exploiting the internet to target the UK in a variety of ways. Identity theft and fraud online now dwarf their offline equivalents. Cyber space allows criminals to target the UK from other jurisdictions around the world, making it harder to enforce the law.

3.170 Some of the most sophisticated threats to the UK in cyber space come from other states which seek to spy on or compromise our military, industrial and economic assets.

3.171 Cyber space is already used by terrorists to spread propaganda, radicalise potential supporters, raise funds, communicate and plan. While terrorists can be expected to continue to favour high-profile physical attacks, the threat that they might also use cyber space to facilitate or to mount attacks against the UK is growing.

3.172 The threat to the UK from politically motivated activist groups operating in cyber space is real. Attacks orchestrated by hacktivists on public and private sector websites and online services are becoming more common and aim to cause disruption and reputational and financial damage and to gain publicity.

Planning by the Government, the devolved administrations and the emergency responders

3.173 The 2010 Strategic Defence and Security Review, *Securing Britain in an Age of Uncertainty*, announced a £650 million, four-year National Cyber Security Programme (NCSP) intended to transform the Government's response to cyber threats. The NCSP is managed and coordinated on behalf of Government by the Office of Cyber Security and Information Assurance in the Cabinet

Office, under the oversight of the Minister for the Cabinet Office.

3.174 The intelligence agencies and the Ministry of Defence have a strong role in improving our understanding of – and reducing – the vulnerabilities and threats that the UK faces in cyber space. Government Communications Headquarters (GCHQ) in particular is central to this effort. But the Home Office, Cabinet Office and the Department for Business, Innovation and Skills are also receiving funding to bolster their specific individual capabilities, recognising that outreach to business and the public is crucial.

3.175 With the rise of cyber crime, what was once a concern primarily for the defence and intelligence elements of government is now something that concerns us all. As part of the creation of the National Crime Agency, a new national cyber crime capability will be created, drawing together the work currently carried out by the e-crime unit in the Serious Organised Crime Agency (SOCA) and the Metropolitan Police's Central e-Crime Unit.

3.176 Of course, much of the UK's critical infrastructure is not in government hands but is owned and managed by the private sector. CPNI is already working with a network of critical national infrastructure companies and in partnership with the devolved administrations to ensure that they take the necessary steps to protect key systems and data.

3.177 *The UK Cyber Security Strategy: Protecting and promoting the UK in a digital world* was published in November 2011. It is designed to reduce the risks and secure the benefits of a trusted digital environment for business and individuals. Its vision is for the UK, by 2015, to derive huge economic and social value from a vibrant, resilient and secure cyber space, where our actions guided by our core values of liberty, fairness, transparency and the rule of law enhance prosperity, national security and a strong society.

3.178 To achieve this vision, the Cyber Security Strategy will deliver against four objectives: to tackle cyber crime and make the UK one of the most secure places in the world to do business in cyber space; to make the UK more resilient to cyber attacks and better able to protect our interests in cyber space; to help to shape an open, stable and vibrant cyber space which the UK public can use safely and which supports open societies; and to build the UK's cross-cutting knowledge, skills and capability to underpin all our cyber security objectives.

Further information

Office of Cyber Security and Information Assurance (OCSIA)
www.cabinetoffice.gov.uk/content/cyber-security

Centre for the Protection of National Infrastructure
www.cpni.gov.uk

CESG (National Technical Authority for Information Assurance)
www.cesg.gov.uk

Get Safe Online
www.getsafeonline.org

General advice

Resilience

The 'Preparing for Emergencies' booklet, translated into 18 languages, is available at: www.direct.gov.uk/en/ governmentcitizensandrights/ dealingwithemergencies/ preparingforemergencies

www.nidirect.gov.uk/index/government citizens and rights/dealing_with_emergencies/ preparing for emergencies.htm

UK Resilience
www.cabinetoffice.gov.uk/ukresilience.aspx

Wales Resilience
www.walesresilience.org

Scotland
www.readyscotland.org

Northern Ireland Civil Contingencies
www.ofmdfmni.gov.uk/index/making government work/civil contingencies.htm

British Standards Institution
www.bsigroup.co.uk/bs25999

Emergency Planning College
www.cabinetoffice.gov.uk/epcollege.aspx

Specific advice across the UK

Road traffic
www.highways.gov.uk
www.trafficscotland.org
www.roadsni.gov.uk

Rail
www.nationalrail.co.uk
www.translink.co.uk

Fuel
www.decc.gov.uk
www.detini.gov.uk

Gas and electricity
www.decc.gov.uk
www.detini.gov.uk

Water supply
www.defra.gov.uk
www.environment agency.gov.uk
www.sepa.org.uk
www.drdni.gov.uk
www.niwater.com

Food
www.food.gov.uk

Human diseases
www.dh.gov.uk
www.nhsdirect.nhs.uk
www.scot.nhs.uk
www.dhsspsni.gov.uk
www.publichealth.hscni.net
www.hscni.net
www.cabinetoffice.gov.uk/content/ pandemic flu

Animal diseases
www.defra.gov.uk
www.scotland.gov.uk/Topics/farmingrural/ Agriculture/animal welfare/Diseases
www.dardni.gov.uk

Telecommunications and IT

www.cpni.gov.uk

Health and safety

www.hse.gov.uk

www.hseni.gov.uk

Schools

www.education.gov.uk/schools/
adminandfinance/emergencyplanning

www.scotland.gov.uk/Topics/Education/
Schools

www.deni.gov.uk

Severe weather

www.metoffice.gov.uk

Flooding

www.environment agency.gov.uk

www.sepa.org.uk

www.riversagencyni.gov.uk

Fire

www.communities.gov.uk/fire

www.scotland.gov.uk/Topics/Justice/
public safety/fire and rescue services

Useful telephone numbers

Floodline (England and Wales)

0845 988 1188

Flooding Incident Line (Northern Ireland)

0300 2000 100

Scottish Environment Protection Agency Floodline service

0845 988 1188

Highways Agency – 24 hours traffic

08700 660 115

Highways Agency Information Line

0300 123 5000

Traffic Scotland

0800 028 1414

Traffic Watch (Northern Ireland)

0845 712 3321

National Rail Enquiries

08457 48 49 50

Translink (Northern Ireland)

028 9066 6630

Foreign and Commonwealth Office

Travel Advice

0845 850 2829

NHS Direct (England and Wales)

0845 46 47

NHS 24 (Scotland)

08454 24 24 24