Cabinet Office

National Risk Register of Civil Emergencies

2015 edition

National Risk Register of Civil Emergencies

2015 edition

Cabinet Office
70 Whitehall
London SW1A 2AS

Published March 2015

Any enquiries regarding this publication should be sent to us at CCS@cabinet-office.x.gsi.gov.uk.

This publication is available for download at www.official-documents.gov.uk.

This document is also available from Cabinet Office, 70 Whitehall, London SW1A 2AS

The document can also be viewed on our website at www.gov.uk.

Contents

Introduction

Purpose

The National Risk Register of Civil Emergencies (NRR) is the unclassified version of the National Risk Assessment (NRA), a classified assessment of the risks of civil emergencies facing the UK over the next five years. The NRR is a public resource for individuals and organisations wishing to be better prepared for emergencies.

This document

Chapter 1 provides an overview of the main types of civil emergencies that could affect the UK. It also sets out the definition of an emergency as it appears in the Civil Contingencies Act 2004, and shows, within the risk matrices, how these emergencies compare in terms of likelihood, and the scale and extent of the consequences.

Chapter 2 outlines in more detail the civil emergency risks considered, the consequences of these, and how the Government and emergency responders plan to prepare for and respond to them. Chapter 2 also contains links to information and resources to help individuals and communities to plan for emergencies.

Chapter 3 outlines the methodology used to identify, assess and prioritise the risks.

The NRR online

An online version of the NRR can be found on www.gov.uk.

Information to help individuals and businesses plan for emergencies

Businesses may wish to review the **Business Resilience Planning Assumptions**, the **UK and devolved administrations' resilience** websites and also the **Emergency Planning College** website. **Community Risk Registers** are another important source of information for individuals and businesses. They are published by Local Resilience Forums (LRFs) in England and Wales and by Regional Resilience Partnerships in Scotland. Community Risk Registers are available from local authorities. For further information on LRFs, please refer to Chapter 3 of this document.

Further information and resources

Business Resilience Planning Assumptions

www.gov.uk/government/publications/business-resilience-planning-assumptions

UK Resilience

www.gov.uk/government/policies/improving-the-uks-ability-to-absorb-respond-to-and-recover-from-emergencies/

Northern Ireland Civil Contingencies

www.ofmdfmni.gov.uk/index/making-government-work/civil-contingencies.htm

Ready Scotland

www.readyscotland.org

Wales Resilience

www.walesresilience.gov.uk

Emergency Planning College

www.epcollege.com

Chapter 1. The main types of civil emergency

What is a civil emergency?

1.1 The Civil Contingencies Act 2004 (the Act) describes an emergency as:

- **an event or situation which threatens serious damage to human welfare in a place in the United Kingdom**
- **an event or situation which threatens serious damage to the environment of a place in the United Kingdom**
- **war, or terrorism, which threatens serious damage to the security of the United Kingdom.**

What is a risk of civil emergency?

1.2 Every two years the UK Government produces a classified assessment of the risks of civil emergencies facing people in the UK – this is the National Risk Assessment (NRA). In both the NRA and 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. When identifying risks for the NRA and NRR, a '**reasonable worst case**' is chosen which represents a challenging manifestation of the scenario after highly implausible scenarios are excluded.

The NRR risk matrices

1.3 **Figures 1 and 2** on pages 12 and 13 represent the key risks of civil emergencies in the NRA. These are updated within each edition of the NRR to ensure that changes to the assessment of risks in terms of impact, plausibility and likelihood are correctly captured. The assessment of risks is continuous and thus the positioning of risks within the NRR risk matrices remains fluid and subject to change.

Figure 1: Risks of terrorist and other malicious attacks

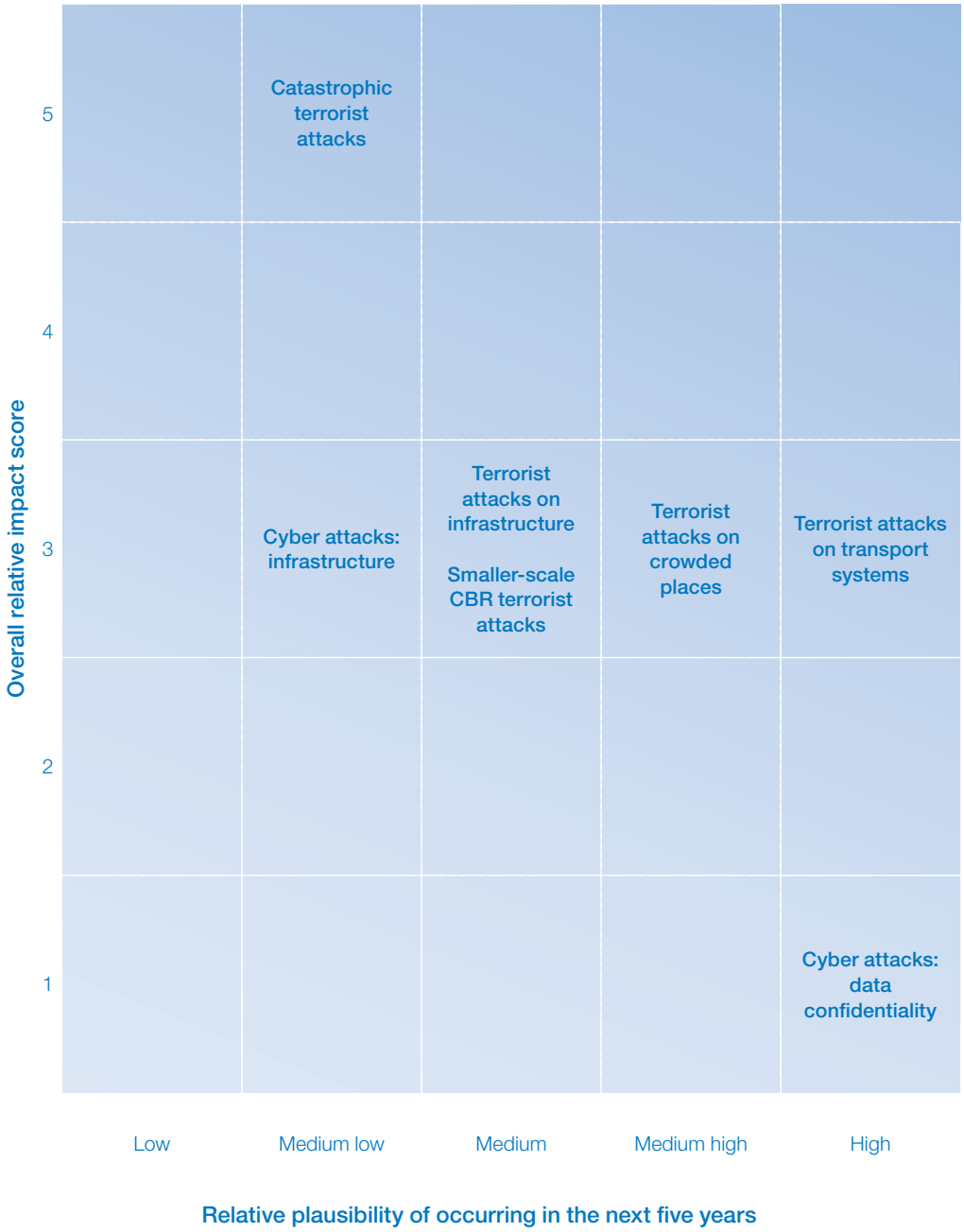

Figure 2: Other risks

Overall relative impact score	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 Widespread electricity failure		
3		**Major transport accidents** **Major industrial accidents**	Effusive volcanic eruption Emerging infectious diseases Inland flooding	Severe space weather Low temperatures and heavy snow Heatwaves Poor air quality events	
2		Public disorder Severe wildfires	Animal diseases Drought	Explosive volcanic eruption Storms and gales	
1			**Disruptive industrial action**		

Relative likelihood of occurring in the next five years

The highest priority risks

1.4 The following, as reflected within the risk matrices, are considered by the Government to be the highest priority risks.

- **Pandemic influenza** – This continues to represent 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 planned for and is not necessarily indicative of future pandemic influenzas. 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 19.
- **Coastal flooding** – The risk is of an event similar in consequence to the 1953 east coast flooding emergency caused by a combination of high tides, a major tidal surge and onshore gale force winds. The consequences of the storm surge in December 2013 were less serious even though sea levels were higher than in 1953. Our assessment is that the likelihood of such severe consequences as in 1953 is lower now due to the investment made in coastal flood defences and flood warnings. For further details see page 21.
- **Widespread electricity failure** – Previously a risk grouped within the major industrial accidents risk category, the risk of widespread electricity failure has been reassessed in light of an enhanced understanding of the risk's impacts. As a result, is now assessed to be very high, and thus a priority risk. Although the UK has never before suffered a national loss of electricity, and this does not represent an increase in likelihood, the consequences of such an event could be significant. For further details see page 38.
- **Catastrophic terrorist attacks** – This type of attack causes long term mass impacts of a magnitude over and above conventional terrorist attacks such as those targeting crowded places or transport systems. Catastrophic terrorist attacks are assessed to be less likely that conventional terrorist attacks. Although catastrophic terrorist attacks are unlikely, 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. For further details on unconventional terrorist attacks see page 49.

Newly assessed risks

1.5 Newly assessed risks include the following.

- **Poor air quality events** – Air pollution harms the environment and can also lead to significant effects on health, particularly for those who suffer from respiratory or cardio-vascular conditions. Ozone and fine solid particles and liquid droplets suspended within the air are the two main causes of poor air quality events and are more likely to occur during heatwaves, as experienced in 2003, 2006 and 2011, when high temperatures and light winds helped to create the necessary conditions. Poor air quality may also occur at other times of the year, particularly in longer periods of settled weather, where high pressure dominates. For further details see page 23.
- In addition, there have been new risks added to the **major transport accidents** and **major industrial accidents** risk

categories. In light of changes to the former risk category, the group's position has been updated within the matrices.

Updates to existing risks

1.6 With each assessment cycle, it is normal for changes to occur in the assessments of individual risks, in view of additional research or the better understanding of a particular risk. Assessments for risks within the 2014 NRR remain broadly the same as in the 2013 edition, but there have been a few changes. Some risk ratings, such as those for **widespread electricity failure**, **effusive volcanic eruptions**, **severe wildfires** and the **disruptive industrial action** risk category have changed in this year's NRR to reflect work undertaken to better understand the risks. The location of the **widespread electricity failure** and **widespread public disorder** risk within the NRR matrices has been updated to better reflect its current positioning within the NRA matrix.

Emerging and longer-term issues

1.7 Only emergency events that are assessed to have a 1 in 20,000 chance or greater of happening within a five-year period, and that will require intervention by the UK Government and/or a devolved administration, are included within the NRA and NRR. Longer-term vulnerabilities or broader issues that have the potential to negatively impact on society, but which are not confined to single events (for example, climate change or organised crime), are not included and do not feature within the risk matrices. Instead, the effects of these are considered as part of the assessment of existing risks. Where relevant, these are mentioned within the risk summaries set out in Chapter 2, where their effects on the particular emergency event are made clear. A particularly serious longer-term issue of this kind is that of antimicrobial resistance (AMR). While not a risk identified and assessed within the NRR, it represents a significant longer-term challenge, as the following section makes clear.

Antimicrobial resistance

1.8 An increasingly serious issue is the development and spread of AMR, which occurs when drugs are no longer effective in treating infections caused by micro-organisms. Without effective antibiotics, even minor surgery and routine operations could become high-risk procedures, leading to increased duration of illness and ultimately premature mortality. Much of modern medicine (for example, organ transplantation, bowel surgery and some cancer treatments) may become unsafe due to the risk of infection. In addition, influenza pandemics would become more serious without effective treatments.

1.9 The numbers of infections complicated by AMR are expected to increase markedly over the next 20 years. If a widespread outbreak were to occur, we could expect around 200,000 people to be affected by a bacterial blood infection that could not be treated effectively with existing drugs, and around 80,000 of these people might die. High numbers of deaths could also be expected from other forms of antimicrobial resistant infection.

1.10 AMR is a global problem and the UK Government, in conjunction with the devolved administrations, is leading work with international partners to secure support for concerted action at a global level. Coordinated international action is needed to tackle AMR as a priority issue through the World Health Organization (WHO) and other UN bodies.

1.11 The Department of Health, the NHS, the Department for Environment, Food and Rural Affairs and the Veterinary Medicines

Directorate are working together with other partners to lead the implementation of the UK five-year Antimicrobial Resistance Strategy, published in September 2013. This work is overseen by a cross-government high-level steering group comprising government departments and agencies and the devolved administrations. In June 2014 it published the measures which are being used to assess the impact of the actions being taken across the UK to reduce the spread of AMR and improve antibiotic prescribing. The high-level steering group's *Progress report and implementation plan* was published on 11 December 2014.

1.12 In addition, in July 2014, the Prime Minister commissioned a review of AMR. The review, chaired by Jim O'Neil, is independent of government and is international in focus. It will explore how the development of new antibiotics can be stimulated and will also examine how best to encourage innovative thinking and research in order to change methods for treating infectious diseases. The review has already produced two reports. The first of these – Antimicrobial resistance: Tackling a crisis for the health and wealth of nations – appeared in December. It quantifies the likely global economic burden of AMR between now and 2050. The second – Tackling a global health crisis: Initial steps – was published on 5 February. It describes steps the reivew believes could and should be taken now in the international effort to tackle AMR. Further reports are expected to be published during 2015. By the summer of 2016, the review will recommend a set of actions to be agreed on at an international level in order to deal with the challenge of AMR.

Further information and resources

UK 5 Year Antimicrobial Resistance Strategy 2013 to 2018

www.gov.uk/government/publications/uk-5-year-antimicrobial-resistance-strategy-2013-to-2018

Progress report on the UK 5 year AMR strategy: 2014

www.gov.uk/government/publications/progress-report-on-the-uk-five-year-amr-strategy-2014

AMR Review

www.amr-review.org

Antimicrobial resistance: Tackling a crisis for the health and wealth of nations

http://amr-review.org/sites/default/files/AMR%20Review%20Paper%20-%20Tackling%20a%20crisis%20for%20the%20health%20and%20wealth%20of%20nations_1.pdf

Tackling a global health crisis: Initial steps

http://amr-review.org/sites/default/files/Report-52.15.pdf

Chapter 2. Risk summaries

2.1 This chapter provides additional detail on risks within the NRR matrices. Each risk summary includes:

- an outline of the risk
- background information on the nature of the risk, and details of previous incidents
- consequences that could result from the reasonable worst-case scenario of the risk
- information covering the planning being done by the Government, the devolved administrations and the emergency responders
- links to further information and resources.

Natural hazards

Human diseases

Risk outline

2.2 Human diseases can take a variety of forms and consequently their impacts can vary considerably in both scale and nature. Influenza pandemics arise because of new influenza viruses that are significantly different from recently circulating influenza viruses. This means that few people, if any, have immunity. An emerging infectious disease is a disease that has recently been recognised or one where cases have increased over the last 20 years, in a specific place or among a specific population.

Background

Pandemic influenza

2.3 Influenza pandemics are natural phenomena that have occurred over the centuries, and most recently in 2009 in the shape of the H1N1 influenza pandemic. There are other influenza strains in circulation globally, such as H5N1 (avian influenza) which emerged in South East Asia in 1996 and caused millions of deaths among poultry and several hundred human deaths. The consensus view among experts is that there is a high probability of another influenza pandemic occurring. It is impossible to forecast its timing or the nature of its impact.

Emerging infectious diseases

2.4 Over the past 25 years, more than 30 new, or newly recognised, infections have been identified around the world, although the likelihood of a new disease spreading to the UK is low. A recent example of a newly emerged infectious disease is SARS (Severe Acute Respiratory Syndrome), which emerged in Asia in November 2002 and posed a global health threat.

Consequences

2.5 Consequences may include:

- in the case of pandemic influenza, half the UK population potentially being infected, with between 20,000 and 750,000 additional deaths potentially by its end

- around 2,000 people infected in the case of a new/emerging infectious disease, with some 100 additional deaths potentially by its end
- in the absence of early or effective interventions to deal with a pandemic, significant social and economic disruption, significant threats to the continuity of essential services, lower production levels, and shortages and distribution difficulties.

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

Pandemic influenza

2.6 The UK Government collaborates actively with international partners on prevention, detection and research to limit the internal spread of a pandemic as far as possible.

2.7 The *UK Influenza Pandemic Preparedness Strategy* was published in 2011. It describes a UK-wide strategic approach to planning for and responding to the demands of an influenza pandemic, taking account of the experience and lessons learned in the H1N1 (2009) influenza pandemic and the latest scientific evidence.

2.8 The UK Government plans to maintain a stockpile of antivirals sufficient to treat 50% of the population and the level of stocks will be kept under review in light of the scientific evidence.

2.9 Arrangements are in place for vaccines to be developed and supplied in the event of a pandemic, although delivery of the first batch of vaccine will not take place until four to six months after the pandemic's start.

Emerging infectious diseases

2.10 The Department of Health (DH) and the devolved administrations have contingency plans in place for dealing with emerging infections. SARS and pandemic influenza contingency plans would provide the basis for dealing with any future outbreak of an emerging infectious disease.

2.11 The NHS and Public Health England (PHE) have plans in place for dealing with both the emergence of an existing disease, such as the Ebola virus disease (EVD), or a new emerging infection, whether arising abroad or in the UK.

2.12 PHE provides specialist health protection, epidemiology and microbiology services across England and collaborates with the health protection agencies (providing similar specialised services) in the devolved administrations. PHE is the lead for the UK on the International Health Regulations, and this extends to protecting the UK from international health hazards, most obviously from communicable diseases.

Further information and resources

Government pandemic influenza guidance

www.gov.uk/pandemic-flu

Public Health England infectious diseases page

www.gov.uk/health-protection/infectious-diseases

Government information on Antimicrobial Resistance (AMR)

www.gov.uk/government/collections/antimicrobial-resistance-amr-information-and-resources

Also:

Scottish Government
www.readyscotland.org/are-you-ready/pandemic-flu

Department of Health, Social Services and Public Safety (in Northern Ireland)
www.dhsspsni.gov.uk/pandemicflu

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

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

Public Health Wales
www.wales.nhs.uk/sites3/page.cfm?orgid=457&pid=27686

Welsh Government
www.wales.gov.uk/topics/health/protection/communicabledisease/flu/;jsessionid=7851FA3EF498070EA885F936A353F033?lang=en

Flooding

Risk outline

2.13 Flooding across the country in 2007, 2009 and more recently in 2013 and 2014 highlights the various forms of flooding that the UK faces. Rising temperatures, which result in storms carrying more rain, and sea level changes associated with climate change are likely to increase the severity of weather events. The three main types 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. The term 'inland flooding' is used to describe all forms of flooding other than coastal.

Background

Coastal flooding

2.14 Coastal flooding has the potential to have the most widespread impact in a single event. 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. Over 600km^2 of land were flooded, 307 people killed and 200 industrial facilities were damaged by floodwater. 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.

2.15 More recently, stormy weather experienced across the UK from late October 2013 through to February 2014 resulted in a number of coastal flooding incidents. The worst tidal surge in 60 years was experienced on England's east coast, leading to 2,800 flooded homes, significant coastal erosion and a need to evacuate thousands of people to safety. Further coastal flooding occurred in early January 2014 when coastal areas, particularly in Wales, Devon and Cornwall, were battered by a combination of rain, the highest waves in 30 years and strong winds. A further storm experienced in February led to significant damage in this part of the UK, with thousands left without power, and a section of sea wall and a 100m stretch of railway destroyed in the coastal town of Dawlish.

Inland flooding

2.16 The frequency of inland flooding is increasing; this is evidenced by several examples of river and surface water floods in 2007, 2009, 2010, 2012, 2013 and 2014. Of these, the events of summer 2007 were the most widespread. In June–July 2007, severe

rainfall during an extremely wet summer led to the flooding of 48,000 households and 7,300 businesses across England. Businesses as well as homes were inaccessible for many months while buildings dried out and damage was repaired. The flooding in Cumbria in November 2009 caused six bridges to collapse, severing the road network and cutting off communities.

2.17 The winter storms experienced from October 2013 to February 2014 also resulted in serious inland flooding. In the wettest winter since records began, south-east, central, southern and south-west England experienced thousands of flooded properties and disruption to rail, road, air and energy infrastructure. Extensive flooding was experienced on the Somerset Levels, where some homes and businesses were under water from January to March 2014, and many residents and livestock had to be evacuated.

Consequences

2.18 Consequences may include:

- casualties and fatalities
- damage to property and infrastructure within the affected area, potentially leading to a need for evacuation or temporary housing for those affected
- loss of/interruption to supply of essential goods and services and disruption to transport and energy networks
- depending on the nature of the incident, contamination and environmental damage.

Planning by the Government, the devolved administrations and emergency responders

2.19 The UK Government has a programme of flood risk management, which aims to reduce the likelihood and consequences of flooding. Local Resilience Forums in England and Wales and Regional Resilience Partnerships in Scotland are required to have planning in place to assess the risk of flooding and develop appropriate contingency plans. These arrangements are constantly under review.

2.20 The Met Office, the Environment Agency, the Scottish Environment Protection Agency (SEPA) and Natural Resources Wales, together with the Flood Forecasting Centre, maintain sophisticated monitoring and forecasting systems for the UK. These anticipate the risk of flooding and provide early warning information about the areas likely to be affected. For coastal, inland and some groundwater flooding in England and Wales, the Environment Agency and Natural Resources Wales provide automated flood warnings directly to registered customers through the Floodline Warnings Direct system which 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.

Further information and resources

Prepare for a flood

www.gov.uk/prepare-for-a-flood

Check flood warnings and river levels

www.gov.uk/check-if-youre-at-risk-of-flooding

Sign up for flood warnings

www.gov.uk/sign-up-for-flood-warnings

Health Guidance and Advice from Public Health England

www.gov.uk/government/collections/flooding-health-guidance-and-advice#people-living-through-a-flood

The dangers of flash flooding and how to stay safe

www.gov.uk/government/publications/flash-flooding

Reducing the threats of flooding and coastal change

www.gov.uk/government/policies/reducing-the-threats-of-flooding-and-coastal-change

Also:

Environment Agency

www.gov.uk/government/organisations/environment-agency

Scottish Environment Protection Agency (SEPA)

www.sepa.org.uk

Natural Resources Wales

www.naturalresourceswales.gov.uk/?lang=en

Rivers Agency Northern Ireland

www.dardni.gov.uk/riversagency/

Department of Health, Social Services and Public Safety (in Northern Ireland) (Health Guidance)

www.dhsspsni.gov.uk/flooding_guidance-3.pdf

Floodline (England, Wales and Scotland)

0845 988 1188

Flooding Incident Line (Northern Ireland)

0300 2000 100

Poor air quality events

Risk outline

2.21 While today the UK enjoys better air quality than it did in previous decades, there nevertheless remains a possibility of short-term poor air quality events (for example, the 20-day ozone event of 2006), particularly during heatwaves. Such events can lead to additional deaths, a reduction in life expectancy for people affected and a range of economic impacts.

Background

2.22 Ozone and fine solid particles and liquid droplets suspended within the air are the two main causes of a poor air quality event, and often occur during heatwaves, as experienced in 2003, 2006 and 2011, where high temperatures and light winds helped create the necessary conditions. Poor air quality may also occur at other times of the year, particularly in longer periods of settled weather, where high pressure dominates.

Consequences

2.23 Consequences may include:

- an increase in hospital referrals and demand placed on both the emergency services and the NHS for those already suffering from respiratory or cardio-vascular conditions
- an increase in deaths, particularly of those already suffering from respiratory or cardio-vascular conditions.

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

2.24 The Department for Environment, Food and Rural Affairs (Defra) works with local and national government, as well as internationally, to improve air quality by controlling emissions and concentrations of harmful pollutants in the environment.

2.25 To meet our international and European obligations on standards of air quality:

- Defra commissions air quality forecasts which it makes available online, and publishes up-to-date information on monitored concentrations
- Defra uses the daily air quality index (DAQI), developed by the Committee on the Medical Effects of Air Pollutants (COMEAP), to provide this information to the public in an accessible form
- advice, also developed by COMEAP and linked to the DAQI pollution bands, is intended to reduce the likelihood of people experiencing adverse effects. This is so that the public, especially vulnerable groups and those with health conditions such as heart or lung problems or asthma, can take appropriate action where necessary
- multi-agency cross-government groups are convened when elevated levels are forecast to determine the need for proactive dissemination of information about anticipated pollution levels.

2.26 Like most other member states, the UK is facing difficulties in meeting the EU air quality standards for concentrations of nitrogen dioxide alongside some of our busiest roads. Our air quality plans set out all the measures we are taking to achieve the air quality standards in the shortest time.

2.27 The air quality forecast and health advice is updated daily and can be found on the UK Air website and on the Defra air quality Twitter feed. People should use this resource for regular updates. There is also a freephone helpline.

Further information and resources

Daily pollution forecast – UK Air website

http://uk-air.defra.gov.uk/forecasting

Air quality Twitter feed

@Defraukair

Air quality telephone helpline

Freephone 0800 556677

Defra Air Quality Plans

http://uk-air.defra.gov.uk/library/no2ten

Health advice

http://uk-air.defra.gov.uk/air-pollution/daqi

Protecting and enhancing our urban and natural environment to improve public health and wellbeing

www.gov.uk/government/policies/protecting-and-enhancing-our-urban-and-natural-environment-to-improve-public-health-and-wellbeing

Also:

http://uk-air.defra.gov.uk

Volcanic hazards

Risk outline

2.28 There are a range of volcanoes across Europe (such as Santorini in the Aegean Sea and Vesuvius in Italy) whose eruption could have significant consequences in the UK; but volcanoes in Iceland (for example, Bárðarbunga) are of most concern because of the active volcanic nature of this region and the prevailing meteorology.

Background

2.29 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.

Explosive volcanic eruption styles emitting mainly ash

2.30 Explosive volcanic eruptions tend to occur when 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. Consequently, the volcanic plumes resulting from this type of eruption consist of fine ash, gas and aerosols.

2.31 If periods of intense volcanic activity of this type coincide with unfavourable weather conditions, they can result in significant ash reaching the UK. 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.

Effusive volcanic eruption styles emitting volcanic gases

2.32 The 1783–84 Laki eruption from Grimsvötn volcano in Iceland is the best understood large magnitude eruption of this type. Analysis of the geological and historical data 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 coincided with mass crop failure and thousands of excess deaths.

Consequences

2.33 Consequences of volcanic hazards depend upon the type of eruption, but may include:

- disruption to aviation
- public health and environmental impacts
- economic impacts.

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

2.34 The International Civil Aviation Organization has an established International Airways Volcano Watch consisting of nine Volcanic Ash Advisory Centres (VAACs) located around the world, each of which has the 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.

2.35 Under the auspices of the World Meteorological Organization, the Met Office is also one of eight worldwide Regional Specialized Meteorological 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 whether passenger safety can be protected.

2.36 Work continues within central government to better understand and plan – in a proportionate way – for the expected impacts of both types of eruption.

Further information and resources

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

British Geological Survey
www.bgs.ac.uk/

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

International Volcanic Health Hazard Network
www.ivhhn.org/

Civil Aviation Authority
www.caa.co.uk/default.aspx?catid=2011&pagetype=90

Severe space weather

Risk outline

2.37 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 flares, has different terrestrial impacts and is the result of different types of solar phenomena.

Background

2.38 Solar activity is cyclical, waxing and waning with an average period of approximately 11 years. The last peak of activity occurred in 2013.

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

2.40 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 approximately a day. Records from solar storms in 1921 and 1960 describe widespread radio disruption and impacts upon railway signalling and switching systems.

2.41 While storm impacts in the mid-to-late 20th century were relatively moderate, dependency upon technology vulnerable to space weather has pervaded many aspects of modern life and therefore the disruptive consequences of a severe solar storm could be significant.

Consequences

2.42 Consequences may include:

- interruption and potential failure of power networks owing to damage to transmission, distribution and generation equipment in electricity networks
- interruption to 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
- disruption to aviation as a result of interruptions to high-frequency radio and satellites used to maintain communications, and the adverse effects on electronic control components in aircraft
- to a lesser extent, a negative impact on public health, owing to higher than normal exposure to solar radiation
- disruption to ground digital components found in all modern technology.

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

2.43 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, the National Grid and others in the energy sector are working closely to clarify the potential impacts of a severe event on electricity assets and networks.

2.44 Where relevant, the lead UK government department for each of the nine critical infrastructure sectors is considering the resilience of its sector to space weather as part of its annual sector resilience plan. A public summary of the most recent plans was published in November 2014.[1]

2.45 The Royal Academy of Engineering's *Extreme Space Weather* report brought together scientific and engineering experts to identify, analyse and critically assess the impacts to the UK's engineering infrastructure.[2] The report's conclusions and recommendations are now being drawn on by the Government to progressively mitigate the impacts of a solar superstorm.

2.46 From spring 2014, and as part of a £4.6 million investment programme, the new Met Office Space Weather Operations Centre has provided space weather forecasts and critical information to help build the resilience of UK infrastructure and impacted industries in the face of space weather events, thereby supporting continued economic growth and helping to protect the technologies our day-to-day lives rely on. This service was officially launched in October 2014.

2.47 Many of the consequences of a severe space weather event would be felt globally. As a result, the UK is working closely with international partners to share knowledge and promote consistency in approach where appropriate.

Further information and resources

The Met Office and Space Weather
www.metoffice.gov.uk/publicsector/emergencies/space-weather

Royal Academy of Engineering
www.raeng.org.uk/publications/reports/space-weather-full-report

Space weather and radiation – health protection guidance
www.gov.uk/space-weather-and-radiation

Space Weather Public Dialogue
www.talkspaceweather.com/

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

British Geological Survey
www.bgs.ac.uk/

British Antarctic Survey
www.bas.ac.uk/

---

1 www.gov.uk/government/publications/sector-resilience-plans

2 www.raeng.org.uk/news/publications/list/reports/space_weather_full_report_final.pdf

Severe weather

Risk outline

2.48 Severe weather can take a variety of forms and can cause significant problems and disruption to daily life. Over the coming years we are likely to see rising temperatures and sea levels and an increase in the severity of weather events in the UK. The main types of severe weather necessary to plan for at national level include storms and gales, low temperatures and heavy snow, heatwaves and drought.

Background

Storms and gales

2.49 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. By contrast, the 1990 storm was more extensive and had higher peak wind speeds. The net effect was a much higher death toll but less damage to trees and property.

2.50 More recently, on 28 October 2013, a severe storm, which the media named the 'St Jude's Day' storm, travelled across southern England. The timing of the storm meant that trees were still in full leaf and vulnerable to strong winds. The path of the storm was also significant – strong gusts of 70 to 80 mph are rare in southern England, making these areas more vulnerable to the impacts of severe weather. Falling trees were the main cause of disruption, contributing to widespread transport disruption and power outages, with more than 660,000 homes left without power. Four people died as a result of falling trees.

Low temperatures and heavy snow

2.51 There have been a number of recorded occasions of snow covering large areas of the country for over a week. The winter of 2009–10 saw a prolonged spell of cold weather that lasted for approximately a month. During this time, snowfalls of up to 40cm were 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. 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.

Heatwaves

2.52 The Met Office uses a range of threshold temperatures, varying by region, to define a heatwave. High temperatures were widespread during August 1990, reaching a record 37.1°C in one part of England. In August 2003, the UK experienced heatwave conditions lasting 10 days and resulting in 2,000 excess deaths.[3] During this heatwave, a record maximum temperature of 38.5°C was recorded at Faversham in Kent. In July 2006, similar conditions occurred, breaking records and resulting in the warmest month on record in the UK.

Drought

2.53 Droughts are natural 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 picks up indications of the development of any significant deficits.

2.54 Climate change may increase the risk of droughts but not necessarily lead to a more frequent use of restrictions on water

[3] Excess deaths are defined as the increase in deaths in a population above those that are expected or predicted for a given timeframe.

use. Planning for periodic restrictions on non-essential water use is an integral part of water resource management by water companies. Over the past 40 years we have experienced five long-duration drought events and two short-duration events in England. During the 2010–12 drought, despite some of parts of south-east and eastern England recording their lowest 18-month rainfall in at least 100 years,[4] its impact extended only as far as the inconvenience for 20 million domestic customers of a temporary ban on the use of hosepipes. The environment and agriculture sectors were also temporarily affected by this drought.

Consequences

2.55 Consequences may include:

- an increased number of admissions to hospital and consultations with GPs, and additional demands placed on the emergency services
- fatalities, particularly among the vulnerable and elderly; for example, in the case of heatwaves, an estimated 75 extra deaths per week for each degree of increase in temperature
- damage to property and infrastructure within the affected area, potentially leading to a need for evacuation or temporary housing for those affected
- disruption to travel and logistics, due to deterioration of the road, runway surfaces and vehicle breakdowns
- loss of/interruption to supply of essential goods and services and disruption to transport and communications networks
- depending on the nature of the severe weather, economic impact and environmental damage.

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

2.56 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 risk assessment system that indicates the likelihood and level of impact expected from a severe weather event.

2.57 The Heat-Health Watch system operates in England between 1 June and 15 September each year in association with the Department of Health and the Met Office. A Heat-Health public health alert and advice system operates in Wales during the same period, operated by Public Health Wales.

2.58 The systems are comprised of 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.

2.59 Water companies' statutory drought plans have trigger points to initiate a range of actions during the various stages of a drought to manage supplies and demand. 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.

[4] www.ceh.ac.uk/data/nrfa/nhmp/other_reports/2012_Drought_Transformation.pdf

Further information and resources

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

What to do in severe weather
www.metoffice.gov.uk/guide/weather/severe-weather-advice

Get ready for winter
www.metoffice.gov.uk/learning/get-ready-for-winter

Get ready for summer
www.metoffice.gov.uk/get-ready-for-summer

The Snow Code
www.metoffice.gov.uk/get-ready-for-winter/out-and-about/the-snow-code

Keep warm, keep well
www.metoffice.gov.uk/learning/get-ready-for-winter/health-and-welbeing

Driving in adverse weather conditions
www.gov.uk/driving-adverse-weather-conditions-226-to-237/wet-weather-227

Heat-Health Watch England
www.metoffice.gov.uk/weather/uk/heathealth/index.html

Heat-Health Watch Wales
www.nhsdirect.wales.nhs.uk/heathealthwatch/

Maintaining secure water supplies
www.gov.uk/government/policies/maintaining-secure-water-supplies-high-standards-of-drinking-water-and-effective-sewerage-services

Water situation reports for England
www.gov.uk/government/collections/water-situation-reports-for-england

Scottish Government
www.readyscotland.org/are-you-ready/winter-weather

Public Health England
www.gov.uk/government/organisations/public-health-england

Scottish Environment Protection Agency
www.sepa.org.uk

Welsh Government Winter Weather
www.wales.gov.uk/topics/housingandcommunity/safety/walesresilience/winterweather/;jsessionid=9150F2B014E2FE474104AA4803736F56?lang=en

Northern Ireland Executive
www.doeni.gov.uk/index/protect-the-environment/water.htm

Severe wildfires

Risk outline

2.60 Wildfires are predominantly started as a result of human activity. This could be accidental, through carelessness (for example, as a result of barbeques or camp fires), or deliberate. Sparks from power lines and transport, or ordnance in military training areas, have also been known to start wildfires. Natural phenomena (for example, lightning) also account for a proportion of wildfires.

Background

2.61 Some weather conditions (for example, hot, dry and/or windy) provide good conditions for wildfires to start and spread. These weather conditions tend to be relatively short-lived and not spread evenly across the

year. The UK nominally has two fire seasons: spring (March to May); and summer (July to September). In years where there has been a significant drought, the number of wildfires usually rises significantly. Climate change is likely to lead to changes in the rainfall patterns that affect the UK, and to longer drier summers, thus increasing the risk of drought and more frequent, larger fires.

2.62 The risk of wildfires is also affected by the availability and dryness of fuel for the fire to burn (for example, vegetation). Increased or significant rainfall which causes vegetation to grow excessively can, when the vegetation is dry, increase the risk.

2.63 Casualties from wildfires tend to be low, but there could be significant distress and health consequences, such as an increase in respiratory ailments due to smoke or fumes.

2.64 Wildfires may disrupt many aspects of day-to-day life, for instance roads and schools could close and people may need to be evacuated from affected urban areas. Disruption to electricity, fuel supplies, airport flight paths and telecommunications is also possible if the fire reaches electricity sub-stations, fuel pumping stations or telecommunications masts.

2.65 There is also a possibility of water contamination as ash and other burn particulates dissolve into groundwater and reservoir supplies.

Consequences

2.66 Consequences may include:

- casualties and fatalities
- air pollution and its associated health impacts
- damage to property and infrastructure within the affected area, potentially leading to a need for evacuation or temporary housing for those affected
- loss of/interruption to supply of essential goods and services and disruption to transport network
- possible contamination of groundwater/ wider environment.

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

2.67 The Department for Communities and Local Government (DCLG) is responsible for supporting local fire and rescue authorities in England.

2.68 The devolved administrations are responsible for the Fire and Rescue Services in Northern Ireland, Scotland and Wales.

2.69 DCLG continues to work closely with both the Fire and Rescue Service and Local Resilience Forums in England (operating on a multi-agency basis to plan and prepare for localised incidents and wider large-scale emergencies) to consider the severe wildfire risk in a local context.

Further information and resources

Be fire aware in the great outdoors

www.naturalengland.org.uk/ourwork/climateandenergy/climatechange/drought/wildfirefeature.aspx

Natural Hazards Partnership, Science Note on Wildfires

www.metoffice.gov.uk/nhp/media.jsp?mediaid=15110&filetype=pdf

Fire statistics Great Britain

www.gov.uk/government/collections/fire-statistics-great-britain

Animal diseases

Risk outline

2.70 There have been a number of significant outbreaks of exotic notifiable diseases in animals in the UK in the past with foot and mouth disease (2007) and avian influenza ('bird flu') (last case in February 2015) being the most notable examples. Although the potential exists for very large national outbreaks, the most likely disease incursion is a small-to-medium-sized outbreak.

Background

Non-zoonotic notifiable animal diseases (for example, foot and mouth disease)

2.71 Non-zoonotic diseases are not transmittable 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 swine fevers and bluetongue.

2.72 **Foot and mouth disease** is spread very rapidly through both direct and indirect contact and can be windborne.

2.73 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.

2.74 **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. Following a vaccination campaign, the UK is now free of Bluetongue, but UK livestock remains susceptible to new strains.

Zoonotic notifiable animal diseases (for example, highly pathogenic avian influenza)

2.75 Zoonotic notifiable animal diseases are those diseases that can be transmitted naturally between vertebrate animals and humans. The ease with which zoonotic disease transmission occurs varies by disease.

2.76 **Highly pathogenic avian influenza** has been recorded in poultry in the UK several times in the last 10 years, most recently in 2014. Migratory wild birds can spread and introduce it by direct and indirect contact with poultry. It can also be introduced by mechanical transmission of infected material.

2.77 **West Nile virus** is a viral infection mainly of birds, horses and humans, which is spread by the bite of infected mosquitoes. It 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 identified in horses or humans in the UK.

2.78 **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. 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.

Consequences

2.79 Consequences for this risk may include:

- disruption to rural communities and economies
- economic damage to the agricultural industry.

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

2.80 The UK Government works to provide effective guidance to prevent an outbreak of animal disease occurring in the first place, but it also tries 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.

2.81 **Foot and mouth disease** – The UK 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, even if implemented, does not replace a culling policy. Measures for reducing the risk of introduction include effective control on imports of meat, other animal products and susceptible animals.

2.82 Measures to reduce the risk of introduction of other animal diseases include controls on imports of cattle and sheep and vaccination campaigns, where appropriate.

Further information and resources

Protecting animal health and preventing disease

www.gov.uk/government/policies/protecting-animal-health-and-preventing-disease-including-in-trade

Zoonotic diseases (zoonoses): guidance, data and analysis

www.gov.uk/government/collections/zoonotic-diseases-zoonoses-guidance-data-and-analysis

Disease notification: duties of farmers

www.gov.uk/disease-notification-duties-of-farmers

Animal diseases: international monitoring

www.gov.uk/government/collections/animal-diseases-international-monitoring

Food safety advice

www.food.gov.uk

Major accidents

Major industrial accidents

2.83 This major industrial accidents category includes a number of individual risks from the NRA that have been grouped together.

Risk outline

2.84 Much has been done in the UK both to help 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 both in scale and nature. In most cases they will have no or very limited impact beyond the immediate vicinity and can be dealt with locally, although it is possible for there to be more significant consequences.

Background

Fires

2.85 Fire can be a risk either in its own right or because of the damage that it can cause. 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

2.86 Contamination can take many forms. In 2005, over 650 products were taken off the shelves in UK supermarkets due to concerns about the contamination of food products with Sudan 1, a colouring agent banned in many countries, although still used in some parts of the global food industry.

2.87 In 1976, an accident occurred at a chemical plant near Seveso, Italy, leading to a release of a small amount of a highly toxic material into the air contaminating 25km^2 of land and vegetation. More than 600 people had to be evacuated from their homes and, while there were no direct fatalities, up to 2,000 people were treated for dioxin poisoning and a number of pregnancies were aborted on medical advice. In the contaminated area many animals were culled due to possible contamination.

2.88 In some cases, an accident may have serious impacts on local wildlife and the surrounding environment. For example, in 1996, the crude oil tanker *Sea Empress* grounded off south-west Wales, spilling approximately 72,000 tonnes of oil into the sea. 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

2.89 A loss of gas supply could be significant for those who rely on gas for heating and cooking. For example, 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 for heating, cooking and hot water, as did hotels and restaurants. Industries 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.

2.90 Another scenario is that of a bank experiencing severe, and prolonged, technical problems affecting its core technology infrastructure. Where this risk crystallises, and existing robust resilience arrangements do not provide sufficient mitigation, customers may struggle to access their bank accounts,

make card payments, process new direct debits or withdraw money from ATMs. Where customers do not have access to alternative banking facilities (for example, by having an additional current account with a separate bank or building society), serious difficulties could be experienced, giving rise to the potential for significant economic impacts.

2.91 Other examples of technical failure include the following.

- In April 2007, a major pumping component at a waste water treatment plant serving 800,000 customers 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.

Nuclear accidents

2.92 Nuclear sites are designed, built and operated so that the chance of an accident and any release is very low. Accidents have occurred, however, notably at Windscale (UK) in 1957, Three Mile Island (US) in 1979, Chernobyl (Ukraine) in 1986 and Fukushima (Japan) in 2011. In the last two cases, radioactivity was released from the site.

Consequences

2.93 Consequences of industrial accidents may include:

- casualties and fatalities
- damage to property and infrastructure within the affected area, potentially leading to a need for evacuation or temporary housing for those affected
- loss of/interruption to essential goods and services and disruption to transport networks
- depending on the nature of the incident, contamination (including of the food chain) and environmental damage.

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

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

2.95 The current legislation is the Control of Major Accident Hazard Regulations 1999 (COMAH) and Control of Major Accident Hazard Regulations (Northern Ireland) 2000 under which major hazard sites are regulated and inspected in accordance with the regulations. The main aim is to prevent and mitigate the effects of major accidents involving dangerous substances.

2.96 Following the accident at the nuclear power plant at Chernobyl in 1986, the UK Government prepared a National Response Plan for dealing with the effects of overseas nuclear accidents on the UK population and infrastructure and set up the Radioactive Incident Monitoring Network (RIMNET) across the UK. In response to the emergency at Japan's Fukushima Dai-ichi nuclear power site in 2011, the Government requested HM Chief Inspector of Nuclear Installations to examine the circumstances of the Fukushima accident to see what lessons could be learned to enhance the safety and emergency response arrangements for nuclear sites in the UK. The implementation of these recommendations is being overseen by the Office for Nuclear Regulation (ONR).

2.97 In the event that an industrial accident involving hazardous materials does take place, emergency responders have a well-developed capability for dealing with it. They 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 casualties. Both the Ambulance and the Fire and Rescue Services have ways to decontaminate people affected by such an incident and local authorities have plans in place to open reception centres for those caught up in an 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 so that the area can be returned to normal use.

Sector-specific planning for responding to emergencies

Water and sewerage

2.98 The Security and Emergency Measures (Water and Sewerage Undertakers) Direction of 1998 and the Security and Emergency Measures (Scottish Water) (Scotland) Direction 2002 place statutory requirements on water companies in England, Wales and 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.

Gas

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

Telecommunications

2.100 The UK telecommunications sector is inherently resilient due to the underlying structure and historic investment made by the large telecoms providers. The industry has extensive and well-practised plans in place for managing emergencies and these plans involve a high level of cooperation between companies. It is therefore commonly accepted that the likelihood of a widespread telecoms emergency is low – in recent years there have been some relatively minor issues, mainly derived from severe weather, which can result in access issues for network repairs, or from power loss which can have an impact on telecoms. Core networks are very resilient although there can be issues in the access network (the connection point between the customer and the exchange/core network) as this is usually the oldest part of the network. Business customers in particular should discuss their needs with their provider to ensure they have adequate levels of resilience in place.

2.101 The Electronic Communications, Resilience and Response Group (EC-RRG) plays a key role in terms of the telecoms sector's resilience. EC-RRG is an industry-run group, supported by the Department for Business, Innovation and Skills, which acts to raise awareness of telecommunications resilience and to disseminate best practice. EC-RRG owns and manages the National Emergency Plan for Telecoms and facilitates a response to major incidents through the NEAT (National Emergency Alert for Telecommunications) protocol. The Cabinet Office also provides guidance for organisations to improve their resilience.

Fuel

2.102 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 services providers.

Marine pollution

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

Planning for dam inundation

2.104 The Environment Agency has 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 Reservoirs Act 1975. 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.

2.105 The Environment Agency's 'What's in your backyard?' website enables users to view whether an address in England and Wales is in an indicated flood zone for a reservoir.

Further information and resources

What's in your backyard?

http://apps.environment-agency.gov.uk/wiyby/

Telecoms resilience guidance

www.gov.uk/telecoms-resilience

Government Decontamination Service

www.gds.gov.uk

How we respond to marine pollution incidents

www.gov.uk/how-we-respond-to-marine-pollution-incidents

Marine Pollution Contingency Plan

www.gov.uk/government/publications/marine-pollution-contingency-plan

Radioactive Incident Monitoring Network (RIMNET)

www.gov.uk/government/organisations/department-of-energy-climate-change/series/radioactive-incident-monitoring

Nuclear emergency planning: consolidated guidance

www.gov.uk/government/publications/nuclear-emergency-planning-consolidated-guidance

Control of Major Accident Hazards (COMAH)

www.hse.gov.uk/comah/

Widespread electricity failure

Risk outline

2.106 A nationwide loss of electricity is an extreme scenario and to date a total system shutdown has not occurred in the UK. However, whilst this risk is considered very unlikely, our reliance on electricity means that even localised losses can have a severe impact on those affected.

2.107 A nationwide loss of electricity, for which the technical recovery process "Black Start" could take up to 5 days, would affect millions of consumers and critical services. If significant damage is caused to the transmission lines, it could be weeks before some parts of the network are fully recovered and power is restored.

Background

2.108 Whilst there has never been a complete failure of the electricity network there have been storms and other events that have caused electricity disruption. It is therefore considered that the most likely cause of an electricity shutdown would be severe weather, in particular a combination of strong winds and lightning causing technical failures.

2.109 A recent example of the impact of severe weather was between 22 and 28 December 2013 when, as a result of two severe winter storms and consequent damage to the distribution overhead line network, almost 1 million properties suffered disruption to electricity supplies in the UK. Though 876,000 customers were restored within 24 hours, 16,000 customers experienced disruption to supply in excess of 48 hours.

Consequences

2.110 Consequences may include:

- some casualties and fatalities, caused by accidents of various sorts due to the loss of power
- loss of/interruption to supply of essential goods and services and disruption to transport and energy networks

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

2.111 The Department of Energy and Climate Change (DECC) is responsible for managing the central government response to and recovery from an electricity disruption event in England, Scotland and Wales.

2.112 DECC works closely with industry to ensure that there are comprehensive plans in place for handling a complete national outage, and in collaboration with the devolved administrations to ensure plans are in place to handle more likely localised outages across a number of local areas. In the event of a national power outage, and provided there has been no damage to the system, the objective would be to restore supplies throughout the UK within five days although full restoration may take longer. Restoration of supplies could take longer if significant damage had been sustained to electricity infrastructure.

Further information and resources

More information on DECC's emergency plans:

www.gov.uk/preparing-for-and-responding-to-energy-emergencies

For advice on your network operator and who to contact in the event of a power cut:

www.energynetworks.org/

Major transport accidents

2.113 This major transport accidents category includes a number of individual risks from the NRA that have been grouped together.

Risk outline

2.114 Transport accidents occur across the UK on a daily basis, mainly on roads involving private vehicles, 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

2.115 There have been no 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. More recent, smaller-scale incidents include the Vauxhall helicopter crash in London on 13 January 2013, resulting in the deaths of the pilot and a passer-by struck by falling debris, and the Glasgow helicopter crash of 29 November 2013, where an aircraft lost power and crashed, killing three crew members and seven individuals on the ground.

Maritime

2.116 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, and more recently the capsizing and sinking of the *Costa Concordia* off the Italian coast in January 2012 with the loss of 32 passengers, also demonstrate the potential for loss of life.

2.117 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

2.118 While accidents do occur much more frequently on the UK's road networks than on other forms of transport, the scale of even the largest such incident would be highly unlikely to warrant a coordinated UK government or devolved administration 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 UK government or devolved administration response.

Consequences

2.119 Consequences may include:

- casualties and fatalities
- damage to property and infrastructure within the affected area, potentially leading to a need for evacuation or temporary housing for those affected
- depending on the nature of the incident, contamination and environmental damage.

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

2.120 Individual transport sectors are, mostly, subject to regulation of their service provision. All transport sector operators have plans that cover a range of possible incidents, including those most likely to create a wider

impact. These plans include the diversion of resources where possible (based on safety and operational requirements).

2.121 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 and resources

Department for Transport
www.dft.gov.uk

Civil Aviation Authority
www.caa.co.uk

Get traffic information to plan your journey
www.gov.uk/traffic-information

Traffic Wales
www.traffic-wales.com

Traveline Scotland
www.travelinescotland.com

Traffic Scotland
www.trafficscotland.org

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

Disruptive industrial action

2.122 This disruptive industrial action category of risks includes a number of individual risks from the NRA that have been grouped together.

Risk outline

2.123 Industrial action occurs when members of a trade union are involved in a dispute with their employer that cannot be resolved by negotiation. Industrial action takes the form of strike action, a concerted stoppage of work, or action short of a strike, which could be refusing to perform certain duties or cooperate with the employer. Industrial action of varying degrees of intensity and scale can occur in the UK.

2.124 The UK Government and the devolved administrations work to monitor the frequency and potential impact of industrial action disputes, and promote the mediation services of the Advisory, Conciliation and Arbitration Service (ACAS).

Background

Industrial action

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

2.126 In recent years, there have been strikes by fuel tanker drivers, firefighters, teachers, health service staff, London Underground workers, local and central government workers and other groups of workers, in both the public and private sectors. While comprehensive contingency plans can mitigate the main impacts of strikes, some services have to operate at a reduced capacity which can cause disruption to some users, such as passengers who rely on rail services.

Consequences

2.127 Consequences may include:

- potential disruption to non-essential services causing widespread inconvenience and difficulties for service users
- potential for wider economic impacts.

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

2.128 Contingency planning for industrial action is usually undertaken as part of business continuity planning. In some cases, it falls within the obligations placed on some essential services, such as the emergency services, by the Civil Contingencies Act (2004).

2.129 Industrial action, and any concurrent protests, also has the potential to pose significant public order challenges and place considerable demand on police resources. The UK 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.

Further information and resources

Taking part in industrial action and strikes

www.gov.uk/industrial-action-strikes

Stopping industrial action: citizens' rights

www.gov.uk/stopping-industrial-action-citizens-rights

If your business faces industrial action

www.gov.uk/if-your-business-faces-industrial-action

Industrial action and the law

www.gov.uk/government/publications/industrial-action-and-the-law

Widespread public disorder

Risk outline

2.130 Public disorder can manifest itself in many ways and can include rioting, looting, vandalism, violence and arson. A key characteristic of these types of public disorder is their unpredictable nature. 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 friction are already present. Other social, economic and environmental factors may be behind unrest, but it can fall to one single incident to push these grievances towards violent clashes.

Background

2.131 In recent times there have been instances of serious public disorder. 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.
- Other recent examples of serious disorder occurred in London: the G20 protests in 2009 and the 2010 protest against the rise in university tuition fees. Historically, serious disorder on this scale has been relatively infrequent in the UK.

Consequences

2.132 Consequences may include:

- casualties and fatalities
- criminal damage to public and private property and infrastructure within the affected area, potentially leading to a need for evacuation or temporary housing for those affected
- potential for wider economic damage.

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

2.133 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.

2.134 In the UK, civil protection arrangements are designed to be flexible and scalable to adapt to any circumstances. For example, when a public order incident has the potential to place pressure on one police force, the newly enhanced National Police Coordination Centre (NPoCC) will support forces in England and Wales and liaise with Police Scotland and the Police Service of Northern Ireland by ensuring that they receive the assistance needed to respond effectively if appropriate. NPoCC also works to ensure policing resilience during major events and in an emergency that requires a UK police response.

An introduction to terrorist and other malicious attacks

2.135 The UK faces a serious and sustained threat from terrorism both international and relating to Northern Ireland. At the time of publication, the national threat level stands at 'severe' having increased from 'substantial' in August 2014. The threat from Northern Ireland Related Terrorism (NIRT) in Great Britain was reduced from 'substantial' to 'moderate' in October 2012. However, the threat from NIRT in Northern Ireland is currently assessed as 'severe'. 'Severe' means that a terrorist attack is highly likely; 'substantial' that an attack in a strong possibility; and 'moderate' that an attack is possible, but unlikely.

2.136 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 non-conventional weapons such as chemical, biological, radiological and nuclear substances. Others aspire to attack the national infrastructure using both traditional methods and more novel methods such as cyber attack.

2.137 Islamist extremists continue to pose a significant terrorist threat to the UK and to UK interests and nationals abroad. Al Qaida in the Federally Administered Tribal Areas (FATA) of Pakistan provides the ideological lead for the global Islamist extremist movement.

2.138 The threat to the UK from international terrorism has increased, driven by developments in Syria and Iraq. The situation there is providing an environment for terrorist groups, including the Islamic State of Iraq and the Levant (ISIL) and Al Qaida-linked groups, to plan terrorist attacks against the West. The availability of a large pool of individuals who have travelled from the UK and Europe to Syria heightens this threat.

As these individuals return to the UK, there is a risk that a terrorist group will have tasked them to conduct attacks or that they will seek to conduct attacks on their own initiative. In addition, these individuals' knowledge of the UK and native-language skills increase the capability of terrorist groups to target the UK and produce extremist media directed at a UK audience. The Woolwich attack of 2013 and the recent attacks in Paris and Ottawa were a stark reminder of the level of damage and destruction that can be caused by an individual or small group.

2.139 A number of significant terrorist attack plots against the UK in recent years have originated from Al Qaida in the FATA and they continue to provide training and motivation for extremists to carry out terrorist attacks in the UK. Al Qaida continues to pose a threat and groups affiliated to Al Qaida in countries such as Yemen and Somalia have emerged as a threat in their own right. ISIL and the Al Nusrah Front (ANF), Al Qaida's affiliate in Syria, also have ambitions to target the West and may use recruited UK individuals to further their aims.

2.140 The emergence of affiliate groups that pledge allegiance to the Al Qaida senior leadership in the FATA has led to the diversification and growth of the threat from Islamist extremist terrorists around the world. Developments in Syria and Iraq have added to the complexity of the threat picture. The 'Arab spring' has been a key catalyst in increasing the number of Islamist extremist groups, some of which have shown the aspiration to attack the UK or UK interests and nationals abroad. The most significant groups are;

- Yemen: Al Qaida in the Arabian Peninsula (AQAP)
- Syria: Al Nusrah Front (ANF). Al Qaida's affiliate in Syria, it is engaged in providing training to foreign fighters
- North Africa (Sahel): Al Qaida in the Islamic Maghreb (AQIM)
- West Africa: Boko Haram and Ansaru
- East Africa (Somalia): Al Shabaab
- Iraq: Islamic State of Iraq and the Levant (ISIL) or Al Qaida in Iraq (AQI). ISIL has the intent to conduct terrorist attacks against the West.

2.141 Separately, and aside from the risks posed by NIRT and international terrorism, domestic extremists may seek to carry out solo acts of violence. For the most part, the actions of domestic extremists pose a threat to public order, but not national security.

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

2.142 The UK 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 Assessment is focused on preparing for emergencies and mitigating the impact of terrorist attacks (the Prepare workstream of CONTEST), but has links with all of 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.

2.143 Under CONTEST, comprehensive plans have been developed to protect sites critical to the national infrastructure, transport networks including aviation and international rail, 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.

2.144 Part of this training involves raising awareness of the threat from terrorist groups among the responder community, local authorities and other organisations. For example, training is being given to NHS staff in identifying individuals accessing healthcare services who are vulnerable to radicalisation and being drawn into terrorism, and knowing where to refer these individuals for support and protection.

2.145 In regard to domestic extremism, the National Domestic Extremism and Disorder Intelligence Unit continues to take the lead in setting the strategic national direction for domestic extremism intelligence and supports UK police forces in tackling these threats.

Further information and resources

Security Service (MI5)

www.mi5.gov.uk

The UK's Threat Level System

www.mi5.gov.uk/home/the-threats/terrorism/threat-levels/the-uks-threat-level-system.html

Foreign fighters

www.mi5.gov.uk/home/the-threats/terrorism/international-terrorism/international-terrorism-and-the-uk/foreign-fighters.html

Lone actors

www.mi5.gov.uk/home/the-threats/terrorism/international-terrorism/international-terrorism-and-the-uk/the-threat-from-lone-actors.html

National Counter Terrorism Security Office

www.nactso.gov.uk/

Protecting the UK against terrorism

www.gov.uk/government/policies/protecting-the-uk-against-terrorism

Counter-terrorism strategy (CONTEST)

www.gov.uk/government/publications/counter-terrorism-strategy-contest

National Security Strategy

www.gov.uk/government/publications/the-national-security-strategy-a-strong-britain-in-an-age-of-uncertainty

What you can do

www.mi5.gov.uk/home/what-you-can-do.html

Protecting against terrorism

www.gov.uk/government/publications/protecting-against-terrorism

Domestic extremism
www.mi5.gov.uk/home/the-threats/terrorism/domestic-extremism.html

National Domestic Extremism and Disorder Intelligence Unit
www.acpo.police.uk/NationalPolicing/NDEDIU/AboutNDEDIU.aspx

Terrorist attacks on crowded places

2.146 This terrorist attacks on crowded places category of risks includes a number of individual risks from the NRA that have been grouped together.

Risk outline

2.147 While there have been attacks against well-protected targets around the world, crowded places remain an attractive target for a terrorist attack. Crowded places by their nature are easily accessible and offer the prospect for an impact beyond the loss of life alone. Attacks are often carried out without warning.

Background

2.148 Although the UK has faced a variety of terrorist threats in the past, Al Qaida and related terrorist groups have shown a level of ambition and willingness to carry out indiscriminate terrorist attacks. Hotels and restaurants in Egypt, armed assaults in Mumbai and the Westgate shopping mall attack in Kenya have offered terrorists the prospect of high impact attacks with large numbers of casualties.

Consequences

2.149 Consequences may include:

- casualties and fatalities
- damage to property and infrastructure within the affected area, potentially leading to a need for evacuation or temporary housing for those affected
- potential for wider economic damage.

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

2.150 A substantial amount of work has been undertaken over recent years by the national network of counter-terrorism security advisers and others to reduce the vulnerability of crowded places at higher risk of terrorist attack. This has included awareness-raising initiatives and training on protective security as well as the installation of physical security measures where appropriate. Substantial work has also been undertaken to reduce vulnerabilities associated with hazardous substances which could be used to cause harm. This has included implementing new EU regulations which control the marketing and use of the most dangerous explosive precursors (or chemicals which could be used to make an explosive). The revised 2014 Crowded Places delivery programme concentrates on the improvement of protective security through a range of measures offering a consistent and proportionate approach.

2.151 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.

2.152 Long-standing and regularly activated 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. The Joint Emergency Services Interoperability Programme aims to further improve the joint emergency response to any major or complex incident through the development of guidance and joint training and exercising. 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 Hazardous Area Response Teams (which applies to Ambulance Trusts in England only) provides training, equipment and vehicles for ambulance staff to enable them to work in hazardous areas. In Scotland a similar capability is provided by the Special Operations Response Teams of the Scottish Ambulance Service. There are analogous schemes in Northern Ireland and Wales.

2.153 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.

2.154 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 recent 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 to specialist training for ambulance and fire service personnel, as we continue to improve joint working between the emergency services so that they can respond more effectively to this type of incident.

Further information and resources

National Counter Terrorism Security Office

www.nactso.gov.uk/crowded-places

Physical security advice

www.cpni.gov.uk/advice/Physical-security/

Protecting crowded places: design and technical issues

www.gov.uk/government/publications/protecting-crowded-places-design-and-technical-issues

Protecting against terrorism

www.gov.uk/government/publications/protecting-against-terrorism

Terrorist attacks on infrastructure

2.155 This terrorist attacks on infrastructure category of risks includes a number of individual risks from the NRA that have been grouped together.

Risk outline

2.156 The national infrastructure comprises those facilities, systems, sites, networks and essential workers necessary for the functioning of the country and the delivery of the essential services upon 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.

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

Background

2.158 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, 2008 and 2013) and against financial institutions and government buildings (such as the attacks on the World Trade Center in 1993 and the World Trade Center and Pentagon in 2001).

Consequences

2.159 Consequences may include:

- casualties and fatalities
- damage to property and infrastructure within the affected area, potentially leading to a need for evacuation or temporary housing for those affected
- loss of/interruption to supply of essential goods and services and disruption to transport networks
- depending on the nature of the incident, contamination and environmental damage.

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

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

2.161 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 and devolved administrations involved. The Centre for the Protection of National Infrastructure (CPNI) is the UK government authority that provides protective security advice to businesses and organisations across the UK 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 national security threats.

Further information and resources

Centre for the Protection of National Infrastructure

www.cpni.gov.uk

Business security

www.nactso.gov.uk/managing-the-risks

Terrorist attacks on transport systems

2.162 This terrorist attacks on transport systems category of risks includes a number of individual risks from the NRA that have been grouped together.

Risk outline

2.163 Of the different malicious attacks outlined in this document, conventional terrorist attacks on land and air-based 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. The risk to maritime transport systems is judged to be low. These assessments are supported by the many examples of this type of attack perpetrated by different groups across the globe. As the recent incidents outlined below indicate, terrorist attacks on transport systems can take different forms with different levels of impact.

Background

Rail and underground

2.164 Rail and underground networks are open systems, which makes them attractive potential targets, and there have been several successful terrorist attacks on rail networks worldwide.

2.165 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 have also been a number of examples in other countries of successful attacks against underground systems (Moscow, 2004) and mainline rail services (Madrid, 2004).

Air

2.166 Over the past 30 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. 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.

2.167 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 Northwestern Airlines flight from Amsterdam to Detroit. The device used had clearly been constructed to make detection by existing screening methods extremely difficult. In October 2010, a plot to detonate explosive devices concealed in printer cartridges on cargo planes en route to the USA was disrupted.

Maritime

2.168 To date, no attack against maritime interests in the UK has been mounted by terrorists. However, maritime attacks like those seen overseas (for example, the suicide bomb attack on the *USS Cole* 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.

Consequences

2.169 Consequences may include:

- casualties and fatalities
- damage to property and infrastructure within the affected area, potentially leading to a need for evacuation or temporary housing for those affected
- loss of/interruption to essential goods and services and disruption to transport networks.

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

2.170 All transport sector operators have contingency plans that cover a range of possible scenarios including malicious attacks.

Rail and underground

2.171 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 (DfT). 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 DfT on security issues. 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

2.172 Stringent protective security measures exist at UK airports. 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.

2.173 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 DfT to ensure compliance. In addition, DfT provides advice to UK airlines operating overseas on measures needed at their foreign stations. 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

2.174 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 and resources

Managing the risk to transport networks from terrorism and other crimes

www.gov.uk/government/policies/managing-the-risk-to-transport-networks-from-terrorism-and-other-crimes

Transport security

www.nactso.gov.uk/transport

Unconventional terrorist attacks

2.175 This unconventional terrorist attacks category of risks includes a number of individual risks from the NRA that have been grouped together.

Risk outline

2.176 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 not negligible. The UK Government is prioritising efforts to stop terrorists gaining the expertise and the material to deliver such attacks. But if terrorist attacks were successful, their potential impact on the UK would be severe and significantly greater than a conventional attack.

Background

Smaller-scale chemical, biological or radiological terrorist attacks

2.177 To date there have been relatively few examples of terrorist 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.

2.178 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 could 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 of harmful materials 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') that would aim to spread radioactive material over a wide area.

Catastrophic terrorist attacks

2.179 This type of attack causes long-term mass impacts of a magnitude over and above conventional terrorist attacks such as those targeting crowded places or transport systems. As such catastrophic terrorist attacks are less likely to occur. Terrorists will often seek to undertake attacks which target our vulnerabilities and cause disproportionate impacts. While the likelihood of terrorists 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 terrorist 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.

Consequences

2.180 Consequences may include:

- casualties and fatalities who may be contaminated
- damage to property and infrastructure within the affected area, potentially leading to a need for evacuation or temporary housing for those affected
- loss of/interruption to supply of essential goods and services and disruption to transport networks
- depending on the nature of the incident, contamination (of people, buildings, infrastructure, food and/or the environment) and environmental damage which may be difficult to clean up.

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

Smaller-scale chemical, biological or radiological terrorist attacks

2.181 There is a well-developed specialist capability among the emergency responders and other responder agencies for dealing with small-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 to enable them to operate in hazardous environments and to rescue and treat any casualties.

2.182 Both the Ambulance and the 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 an incident or displaced from their homes. Though we have resource, capability and plans in place to respond to smaller-scale CBR terrorist attacks, we are currently refining this to take account of learning collated in a routine review of the response. Specifically, we are making the response more agile, flexible and scalable, and quicker by spreading expertise more widely so that non-specialist emergency service responders are better able to undertake life-saving activities prior to the arrival of specialist resources.

Catastrophic terrorist attacks

2.183 The National Resilience Capabilities Programme, led by the Cabinet Office, is the core framework through which the UK Government seeks to build resilience across the UK to meet the generic consequences of a wide range of civil emergencies, including catastrophic impact attacks. In addition, the Government continues to build capabilities to mitigate the impact of a terrorist attack 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.

2.184 This includes maintaining national stocks of medical counter-measures and agreeing emergency arrangements for their distribution; flexing 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; building evacuation and shelter 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 and resources

Preparation and planning for emergencies: the National Resilience Capabilities Programme

www.gov.uk/preparation-and-planning-for-emergencies-the-capabilities-programme

Hazardous materials

www.nactso.gov.uk/hazardous-materials

Physical security advice – CBR

www.cpni.gov.uk/advice/Physical-security/CBR-Attacks/

Government Decontamination Service

www.gov.uk/government/groups/government-decontamination-service

Protecting the UK against terrorism

www.gov.uk/government/policies/protecting-the-uk-against-terrorism

Cyber security

Risk outline

2.185 Cyber space 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.

2.186 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. Vulnerabilities can take time to identify, leaving vast numbers of systems open to exploitation to be used in attacking other systems and networks remotely.

Background

2.187 Criminals are exploiting the internet to target the UK in a variety of ways. An accurate estimate is difficult and can vary greatly depending on what is included in the analysis, but economic losses as a result of cyber crime are considered to be in the billions of pounds. Cyber space allows criminals to target the UK from other jurisdictions across the world, making it harder to enforce the law.

2.188 Cyber attacks are increasingly being carried out on an industrial scale. Some 81% of large corporations and 60% of small businesses reported a cyber breach in 2013.[5] On average more than 33,000 malicious emails are blocked at the Gateway to the Government Secure Intranet (GSI) every month while around 90 sophisticated attacks are carried out against industry and government per month.

2.189 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.

2.190 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 possibility that they might also use cyber space to facilitate or to mount attacks against the UK is growing.

2.191 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 to gain publicity.

Consequences

2.192 Consequences may include:

- loss/compromise of personal or corporate information
- damage to business, the economy and reputation
- loss of/interruption to supply of essential goods and services and communications network.

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

2.193 The 2010 Strategic Defence and Security Review, *Securing Britain in an Age of Uncertainty*,[6] announced a £650 million, four-year National Cyber Security Programme (NCSP) intended to transform the UK Government's response to cyber threats. The Chancellor of the Exchequer announced an extra £210 million investment after the 2013 spending review. The NCSP is managed and coordinated on behalf of the UK Government by the Office of Cyber Security and Information Assurance (OCSIA) in the Cabinet Office.

2.194 OCSIA coordinates the work carried out under the National Cyber Security Programme and works with government departments and agencies, and the devolved administrations, to provide strategic direction and oversight. It coordinates the Cyber Security Programme for the government to enhance cyber security and information assurance in the UK.

---

[5] www.gov.uk/government/publications/information-security-breaches-survey-2014

[6] www.gov.uk/government/publications/the-strategic-defence-and-security-review-securing-britain-in-an-age-of-uncertainty

2.195 *The UK Cyber Security Strategy: Protecting and promoting the UK in a digital world* was published in November 2011.[7] The Strategy and Programme are delivering 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 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.

2.196 Internationally, the Government continues to work in partnership with a whole host of nations and organisations including the G8, the UN, NATO and the EU, to help shape norms of behaviour for cyber space while promoting the UK as a leader in cyber space technology and policy.

Further information and resources

UK Cyber Security Strategy
www.gov.uk/government/publications/cyber-security-strategy

Cyber Security Strategy: progress so far
www.gov.uk/government/collections/cyber-security-strategy-progress-so-far--2

Keeping the UK safe in cyber space
www.gov.uk/government/policies/keeping-the-uk-safe-in-cyberspace

Office of Cyber Security and Information Assurance
www.gov.uk/government/groups/office-of-cyber-security-and-information-assurance

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

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

Cyber Streetwise
www.cyberstreetwise.org

10 Steps to Cyber Security
www.gchq.gov.uk/press_and_media/news_and_features/Pages/10-steps-to-cyber-security.aspx

Critical Security Controls guidance
www.cpni.gov.uk/advice/cyber/Critical-controls/

Cyber security: what small businesses need to know
www.gov.uk/government/publications/cyber-security-what-small-businesses-need-to-know

Cyber essentials scheme
www.gov.uk/government/publications/cyber-essentials-scheme-overview

[7] www.gov.uk/government/publications/cyber-security-strategy

Chapter 3. Methodology

The NRR risk matrices

3.1 Where possible, risks are shown individually on the matrix as they appear in the NRA. Due to the sensitivity of some of the information included in the NRA, some risks, particularly those concerning terrorist or malicious attacks, are grouped into categories (such as '**terrorist attacks on crowded places**') rather than indicating their exact position in the NRA. These categories are shown in **bold** text.

3.2 When seeking to place categories of risks within the matrix efforts are made to ensure that a position is selected that best represents a category's spread. Particular focus is applied to the impact scores of risks within these categories, to make sure that the most serious risks are not undervalued. The positioning of these categories is kept under review, and updated as necessary.

3.3 Risks not shown in **bold** text in the risk matrices mirror their positions within the NRA.

How are civil emergency risks within the NRA and NRR identified?

3.4 This is done by consulting experts in government departments, devolved administrations and beyond, who between them can 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.

3.5 In the NRA, this consultation has produced a list of some 80 types of event that would meet the definition of a civil emergency given in the Civil Contingencies Act 2004 (referred to hereafter as 'the Act'). A further 40 or so are placed on a reserve list because, although they have been judged not to meet the definition, experts consider that they may do so in the future and need therefore to be kept under review.

3.6 The NRA and the NRR therefore cover:

- all kinds of emergency that meet the definition given in the Act 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
- 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.

3.7 Risks that are considered but excluded are kept under review and are reconsidered for inclusion in the NRR (and NRA), on the basis of the best available evidence.

3.8 The NRR and NRA cover only emergency events and do not include longer-term trends such as technological advances, climate change, or antimicrobial resistance within their risk matrices.

How are the likelihoods of civil emergencies assessed?

3.9 The NRA and NRR estimate the likelihood of events happening within a broad range (see figures 1 and 2 on pages 12 and 13). The likelihood scale used increases exponentially by an order of magnitude per step of the scale (i.e. it is logarithmic). For some risk scenarios, data such as historical analysis and numeric modelling can be used to inform estimates of likelihood (especially for naturally and accidentally occurring hazards). Scientific expertise is also sought to inform the development and review of risks. 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.

3.10 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.

3.11 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 (see figures 1 and 2 on pages 12 and 13). The two scales are not directly comparable with one another; however, for the purposes of planning, a hazard or threat in the top right quadrant of either matrix would be given the same priority.

How are the impacts of civil emergencies assessed?

3.12 The NRA and 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** over the period following the onset of the emergency
- levels of **social disruption** to people's daily lives, from an inability to gain access to healthcare or schools to interruptions in supplies of essential services such as food, water and fuel, and 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 emergencies may have, including widespread anxiety, loss of confidence or outrage that communities may experience.

3.13 Each of the dimensions listed above is scored on a scale of 0 to 5. The overall impact is the mean of these five scores.

Local preparations for emergencies

3.14 Most emergencies are best managed by local emergency responders and emergency planners. The Act 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. The work of identifying potential risks and preparing plans for either preventing

or mitigating the impact of incidents locally is coordinated through Local Resilience Forums (LRFs). LRFs are multi-agency partnerships made up of representatives from local public services, including the emergency services, local authorities, the NHS and the Environment Agency. LRFs are supported by other organisations such as the Highways Agency and public utility companies. In Scotland, the role of LRFs is fulfilled by Regional Resilience Partnerships.

3.15 The UK Government provides guidance on the planning and preparing work coordinated by LRFs based on the NRA, as does the Scottish Government in respect of matters devolved to the Scottish Parliament. 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. Further information can be found on LRFs at: www.gov.uk/local-resilience-forums-contact-details

National preparations for emergencies

3.16 For each of the types of risk in Chapter 2, 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. In Northern Ireland, Scotland and Wales, if the matter is devolved, the devolved administration performs the lead government department function.

3.17 For emergencies on a larger scale, the UK Government has developed:

- the *Government's Concept of Operations*, which sets out the flexible arrangements for coordinating the response to and recovery from emergencies within the UK: www.gov.uk/government/publications/the-central-government-s-concept-of-operations
- contingency plans for responding to the most concerning risks of emergency identified in the NRR – see Chapter 2
- a National Resilience Capabilities Programme, which aims to build a range of capabilities for emergencies: www.gov.uk/preparation-and-planning-for-emergencies-the-capabilities-programme
- a Strategic National Framework on Community Resilience, which explores the role and resilience of individuals and communities before, during and after an emergency: www.gov.uk/resilience-in-society-infrastructure-communities-and-businesses.

3.18 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://walesresilience.gov.uk/?lang=en
- **Northern Ireland:** www.ofmdfmni.gov.uk/civil-contingencies.