Public Health England

FLOODS DESTROY BE PREPARED

Guidance on Recovery from Flooding

Essential information for frontline responders

About Public Health England

Public Health England's mission is to protect and improve the nation's health and to address inequalities through working with national and local government, the NHS, industry and the voluntary and community sector. PHE is an operationally autonomous executive agency of the Department of Health.

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Purpose of flood recovery guidance

This guidance has been developed primarily for public health professionals and frontline responders to support their response to flooding emergencies and subsequent recovery. It contains essential information and advice to give to members of the public seeking help on how to deal with the aftermath of flooding and flood damage.

Flooding has become a more frequent occurrence in the UK. Floodwaters can contain pathogenic and non-pathogenic agents that may remain when the waters recede. As well as groundwater flooding, rivers overtopping or bursting their banks and coastal flooding, problems with sewers and farm land can lead to raw human or animal waste in floodwaters, which can be a health risk to affected populations if not cleaned-up properly.

After the waters recede, remediation and recovery needs to be undertaken to return the area back to normal, and the question remains ‘How can we clean-up effectively and efficiently?’

PHE, in partnership with the Environment Agency, has published public guidance for flooding that is available online[1]. This guidance provides additional important health advice and basic precautions information on how to clean up and recover from flooding to assist local authorities and members of the public with cleaning up after the flood waters have receded.

Additions and amendments in this third version are:

- an updated section on sandbags now including advice on short term storage
- an additional reference under “living in your flood damaged home”
- an additional paragraph on keeping pets safe

1 PHE and EA advice available at; http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1317140405287

Section 1 – General principles for cleaning up

Cleaning up your home[2]

- If insured, call your insurance company as soon as possible and follow its advice.
- Take photographs before you start cleaning and ask your insurer before discarding items that cannot be cleaned (eg mattresses and carpets).
- Cleaning up in this situation can be hard physical work. Remember to rest regularly and not overdo it.

Stay safe[3] and wear protective clothing

- Wear rubber boots, overalls, preferably waterproof and waterproof gloves during the clean-up.
- If you are scrubbing, hosing or pressure-washing, you may cause a lot of splashing and we recommend wearing a standard face mask, such as those sold by DIY stores. Eye protection such as goggles offer added protection and they can be reused after thorough washing.
- Remember to wash your hands thoroughly after each clean-up session. Also wash clothes used for cleaning on a separate cycle from your other clothes.
- Seek medical advice if ill.

Electricity[4]

- Do not turn on electrics if they may have got wet. Only turn them on when they have been checked by a qualified electrician.

Children and pets

- Keep children and pets out of the affected area until clean-up has been completed.
- Do not allow children to play in floodwater areas[5].
- Do wash children's hands frequently – particularly after playing outdoors and always before meals.

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2 Environment Agency, available at; http://www.environment-agency.gov.uk/homeandleisure/floods/114720.aspx
3 HPA Flooding frequently asked questions and advice; available at; http://www.hpa.org.uk/web/HPAweb&HPAwebStandard/HPAweb_C/1213686561005
4 Jonkman SN, Kelman I. An analysis of the causes and circumstances of flood disaster deaths. Disasters 2005; 29: 75-97.
5 CDC advice, available at; http://emergency.cdc.gov/disasters/floods/after.asp

- Do seek medical advice, as under normal circumstances, if infants are unwell with diarrhoea, fever or abdominal pain.
- Do wash floodwater-contaminated toys with hot water and detergent before allowing them to be used. For soft toys, put them in a hot (60°C) machine wash, along with any other affected fabric items.

How and what to clean

Recovery and decontamination of residential areas (eg homes, gardens, schools and playing fields) will be required once the floodwaters have receded.

There are a range of different surface types that may need to be cleaned after a flood, the best approach to cleaning will depend on what the surface or type of material involved is (ie wall or carpet). For example, natural weathering (and drying out) may be the most appropriate approach for recreational areas as sunlight and natural UV radiation are effective at killing micro-organisms[6].

6 Guidance on Microbial Contamination in Previously Flooded Outdoor Areas, CDC, 2012 http://www.cdc.gov/nceh/ehs/Publications/Guidance_Flooding.htm

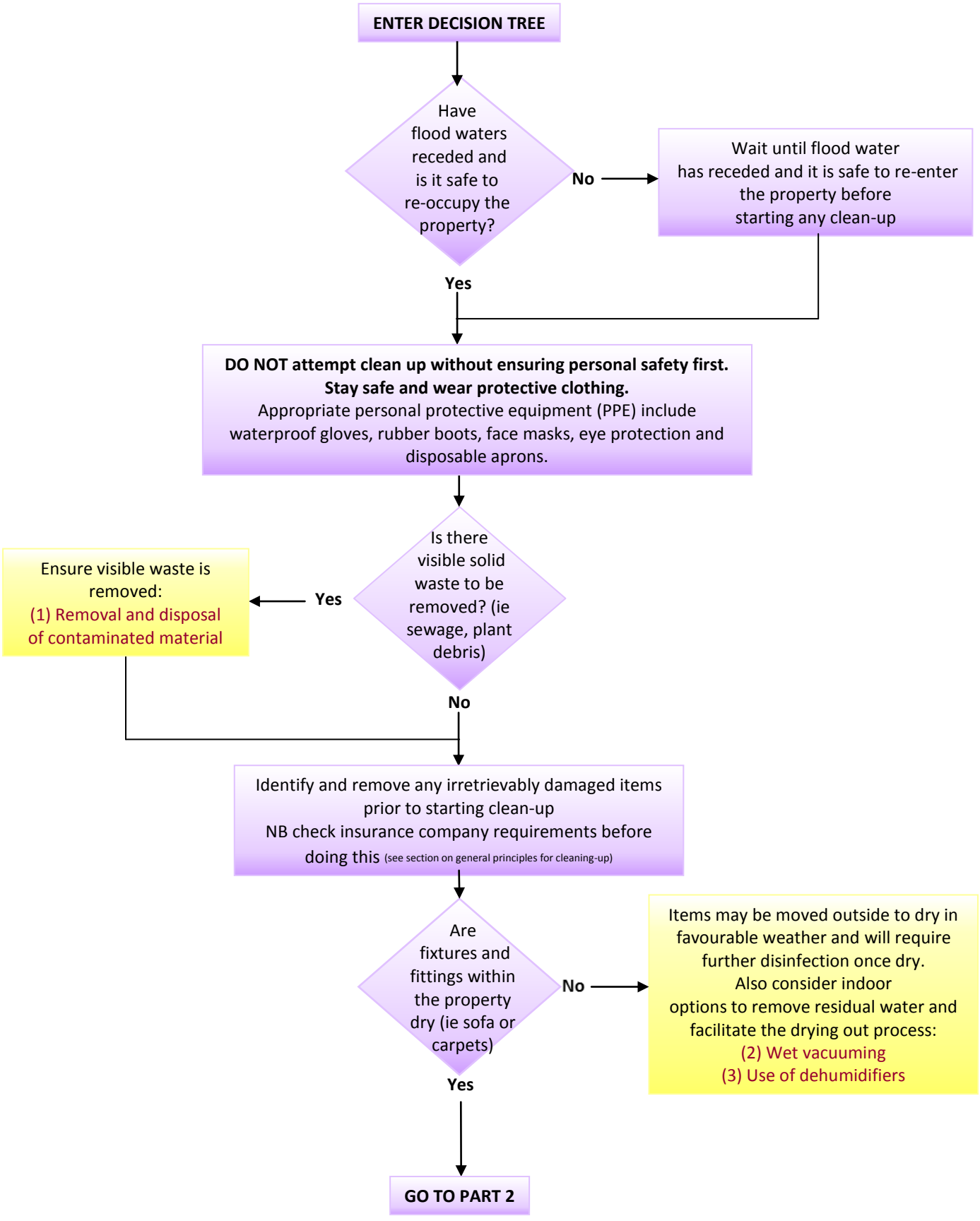
What types of surfaces are there?[7]

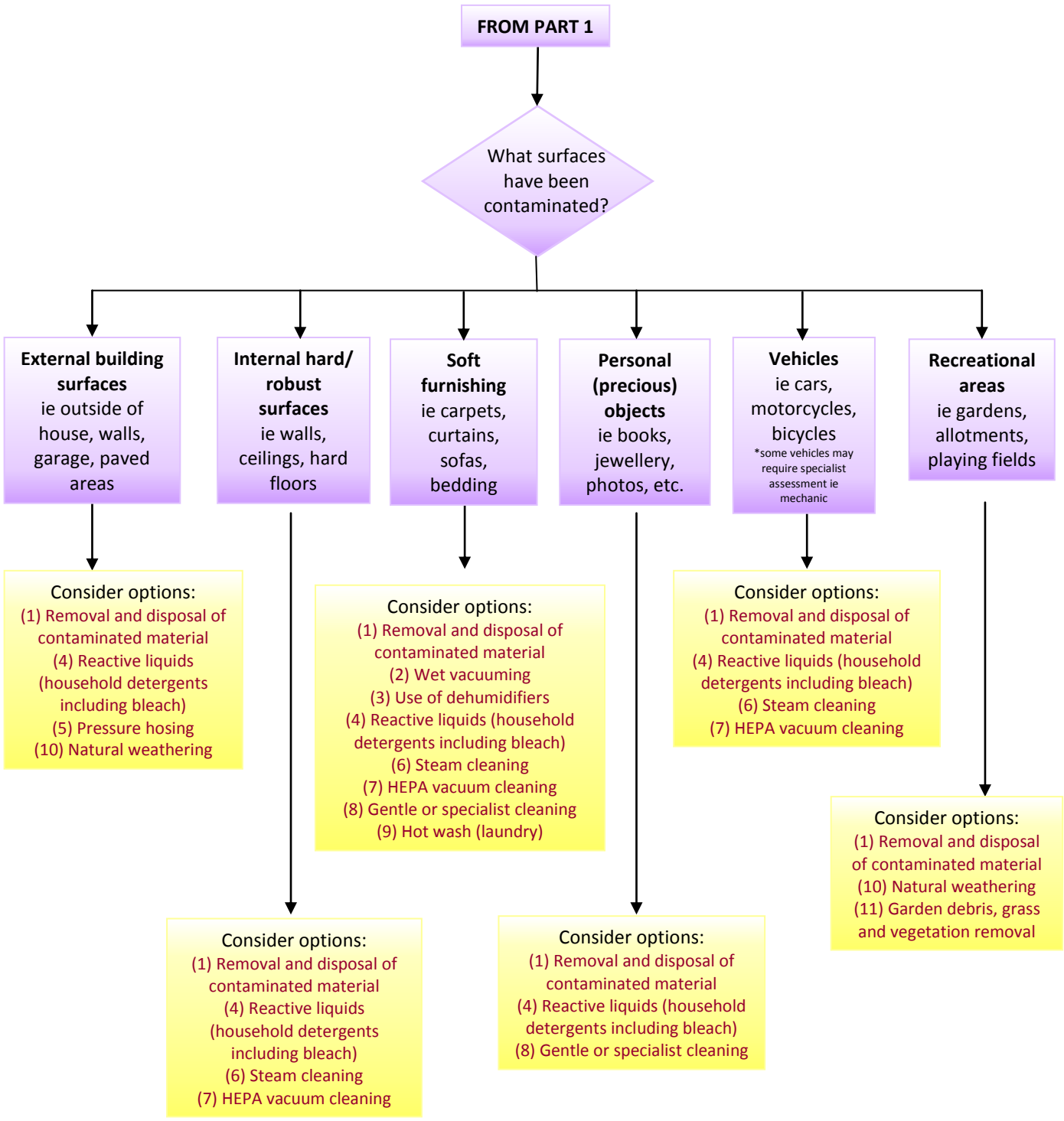
Surface types	Examples	How can they be cleaned?
External building surfaces	Walls, roofs, windows, garages and paved areas	External building surfaces are usually quite robust, so active cleaning (ie household detergents or bleach) or pressure hosing are efficient and effective methods for cleaning.
Internal hard building surfaces	Walls, ceilings, hard floors	Internal hard building surfaces are also quite robust, so active cleaning (ie household detergents or bleach) are efficient and effective methods for cleaning.
Soft furnishings	Carpets, curtains, sofas, bedding	Soft furnishings are porous and absorbant and can be extensively damaged by floodwater, deciding on whether or not to throw them away or get them cleaned (ie steam cleaning or a hot 60°C machine wash) will have to be decided by the homeowner. Remember ask your insurer before discarding items if they cannot be cleaned (eg mattresses and carpets).
Personal (precious objects)	Photos, jewellery, books and CDs etc	Personal (precious objects) can be gently cleaned once they have dried out.
Vehicles	Cars, motocyles, bicycles	The outside of vehicles are quite robust, so active cleaning (ie household detergents or bleach) and pressure hosing are efficient and effective methods for cleaning. However, the inside of vehicles should be considered in the same way as soft furnishings.
Recreational areas	Parks and open spaces, gardens, allotments and playing fields	How soil and vegetation is remediated will depend on what it is used for. The first priority will be to remove obvious signs of contamination once the floodwater has receded. Natural weathering (and drying out) may be the most appropriate approach for recreational areas as sunlight and natural UV radiation are effective at killing micro-organisms[8].

7 Adapted from the UK Recovery Handbook for Chemical Incidents, available; https://www.gov.uk/government/publications/uk-recovery-handbook-for-chemical-incidents-and-associated-publications

8 Guidance on Microbial Contamination in Previously Flooded Outdoor Areas, CDC, 2012 http://www.cdc.gov/nceh/ehs/Publications/Guidance_Flooding.htm

Deciding on how to clean up




FROM PART 1
What surfaces have been contaminated?
External building surfaces ie outside of house, walls, garage, paved areas
Internal hard/ robust surfaces ie walls, ceilings, hard floors
Soft furnishing ie carpets, curtains, sofas, bedding
Personal (precious) objects ie books, jewellery, photos, etc.
Vehicles ie cars, motorcycles, bicycles *some vehicles may require specialist assessment ie mechanic
Recreational areas ie gardens, allotments, playing fields
Consider options: (1) Removal and disposal of contaminated material (4) Reactive liquids (household detergents including bleach) (5) Pressure hosing (10) Natural weathering
Consider options: (1) Removal and disposal of contaminated material (4) Reactive liquids (household detergents including bleach) (6) Steam cleaning (7) HEPA vacuum cleaning
Consider options: (1) Removal and disposal of contaminated material (2) Wet vacuuming (3) Use of dehumidifiers (4) Reactive liquids (household detergents including bleach) (6) Steam cleaning (7) HEPA vacuum cleaning (8) Gentle or specialist cleaning (9) Hot wash (laundry)
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Consider options: (1) Removal and disposal of contaminated material (10) Natural weathering (11) Garden debris, grass and vegetation removal

Recovery options (as identified in the decision tree)[9]

1. Removal and disposal of contaminated material

Contaminated items that are beyond repair or disinfection should be removed from the property and placed in appropriate disposal bins (ie council collection bins, skips) Objects/furnishings that could be considered for disposal include:

- small materials removed from the building (eg books, papers, pictures, wall hangings)
- small equipment and office items (eg staplers, telephones, hand tools)
- large durable materials removed from the building (eg furniture, computers, copiers, fax machines, printers)
- building and decorating materials such as carpeting, draperies, window blinds, window air conditioners, ceiling panels, wallboard, and panelling
- refuse, food, and other unwanted materials present at the site at the time of contamination.

Safety precautions: Take care when lifting heavy objects. Wear appropriate personal protective equipment when handling contaminated material for disposal. Ensure, where possible, contaminated items are double bagged for disposal. Do not leave bags with contaminated food out in open areas as they will attract pests.

2. Wet vacuuming

Wet vacuum cleaners are designed to collect residual water from both hard surfaces (floors) and some soft furnishings such as carpets. Water is collected in the vacuum and can be disposed of down foul water drains and sinks.

Safety precautions: Where possible wear face masks and eye protection such as goggles as vacuums can produce water droplets. Do not plug in electrical equipment until it has been dried thoroughly and inspected by a qualified electrician. Do not use this as a method to remove floodwater from your home.

3. Use of dehumidifiers

Dehumidifiers can be used to collect moisture from the air and can aid in drying out a property after floodwater has receded. Water is collected in the dehumidifier and can be disposed of down foul water drains and sinks.

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9 Recovery options are adapted from the UK Recovery Handbook for Chemical Incidents. For more detailed information on these recovery options, please refer to the Handbook available here; https://www.gov.uk/government/publications/uk-recovery-handbook-for-chemical-incidents-and-associated-publications

Safety precautions: Where possible wear face masks and eye protection when emptying the water collection tank. Do not plug in electrical equipment until it has been dried thoroughly and inspected by an appropriate specialist. Do not use this as a method to remove floodwater from your home.

4. Reactive liquids (eg household bleach and detergents)

Reactive liquids such as household bleach and detergents can be used effectively to remove and kill micro-organisms that may be present following floodwater contamination of surfaces in buildings (ie homes, schools or offices). Household cleaning products and domestic detergents are widely available and can be found in most supermarkets and hardware stores. Diluted bleach can be used to mop hard floors or can be sprayed onto surfaces and then wiped off. Bleach should be left on surfaces for the contact time stated on the manufacturer's instructions to ensure disinfection is effective. Ensure bleach residues are wiped off of surfaces.

Safety precautions: Wear appropriate personal protective equipment (gloves, disposable plastic apron such as those available from DIY stores) and ensure that manufacturer's instructions are followed correctly. Only work in ventilated spaces and do not mix bleach with other cleaning products as this could result in the release of noxious fumes.

5. Pressure hosing

Pressure hosing involves the use of high powered water spray to remove surface contamination. Where possible waste water should be collected for disposal or directed down foul water drains. Ensure that the pressure hose is connected to a clean water supply.

Safety precautions: Only use pressure hosing in outdoor environments. Wear appropriate personal protective equipment (gloves, disposable plastic apron, face mask[10][11] and rubber boots).

6. Steam cleaning

Steam cleaning techniques use machines to spray hot detergent solution(s) onto upholstered surfaces, carpets, tapestries etc, which is then vacuumed off before the fabric becomes saturated. Steam cleaning physically extracts contaminants from

10 Facemasks are recommended to avoid inhalation of potentially contaminated water spray.
11 Larsson BM, Larsson K, Malmberg P and Palmberg L. Airways inflammation after exposure in a swine confinement building during cleaning procedure. American Journal of Industrial Medicine, 2002; 41: 250-258.

materials and surfaces. The steam is applied by hand-held wands or automated systems, and the contaminated waste water is collected for disposal and should directed down foul water drains and sinks. Steam cleaners that use hot water are not suitable for silk, viscose or cotton velvet fabrics. Steam cleaning should be used on dry items.

Safety precautions: Where possible wear face masks as steam cleaning may produce water droplets. Do not plug in electrical equipment until it has been dried thoroughly and inspected by a qualified electrician. Use appropriate protection to prevent burns from hot water and use as per manufacturer's instructions.

7. HEPA vacuum cleaning

High efficiency particulate arresting (HEPA) vacuum cleaners contains a very fine filter (HEPA filter), which makes it useful for this activity as it filters out biological contaminants effectively. They can only be used on dry material.

Safety precautions: It is advisable to wear face masks as vacuums may produce dust particles. Do not plug in electrical equipment until it has been dried thoroughly and inspected by a qualified electrician.

8. Gentle or specialist cleaning

Gentle or specialist cleaning can remove contamination from smaller objects (eg dry cleaning of a wedding dress or gentle cleaning of jewellery) can be done after they have dried out properly. Specialist cleaners should be advised that the item has been exposed to flooding.

Safety precautions: Wear appropriate personal protective equipment (gloves, disposable plastic apron).

9. Hot washing

Hot washing involves the washing of fabrics at temperatures 60°C in a washing machine. This is not suitable for delicate items of clothing or for certain fibres.

Safety precautions: Do not plug in electrical equipment until it has been dried thoroughly and inspected by a qualified electrician. Do not hand wash clothing at high temperatures as this may result in serious burns.

10. Natural weathering (and drying out)

Natural weathering (and drying out) includes a variety of natural processes that under favourable conditions act without human intervention to reduce the level of contamination. This option may be the most appropriate approach for recreational areas as sunlight and natural UV radiation are effective at killing micro-organisms [12].

11. Garden debris, grass and vegetation removal

Garden debris, grass and vegetation removal involves removing residual contamination by cutting the grass or collecting leaves in gardens, allotments and other recreational areas.

Safety precautions: Do not plug in electrical equipment until it has been dried thoroughly and inspected by a qualified electrician. Wear appropriate personal protective equipment when handling contaminated material for disposal. Ensure, where possible, contaminated material is double bagged for disposal. Do not leave bags with contaminated food (garden or allotment produce) out in open areas as they will attract pests.

12 Guidance on Microbial Contamination in Previously Flooded Outdoor Areas, CDC, 2012 http://www.cdc.gov/nceh/ehs/Publications/Guidance_Flooding.htm

Section 2 – Public health advice[13]

General advice

What's the best health advice – isn't there a risk from bugs in the water?

Infection problems arising from floods in this country are rare. Usually any harmful bugs in floodwater become very diluted and present a low risk, but there are a few precautions to be aware of when dealing with flooding which should prevent unnecessary additional health problems:

- wherever possible, try to avoid coming into direct contact with floodwater. If you have to go into the water, wear waterproof gloves and rubber boots and remember to be careful of potentially concealed hazards
- wash your hands – this is the most important way to get rid of harmful bugs. Use warm, clean water and soap, then rinse and dry your hands after going to the toilet, before eating or preparing food, after being in contact with floodwater, sewage or with items that have been in the water. Use cold water to wash if warm is not available. If there is no clean water, use disposable soapy, wet wipes or sanitising gel to carefully clean all parts of your hands and dry them
- keep open cuts or sores clean and use waterproof plasters to prevent them being exposed to floodwater
- keep children out of the water
- do not eat any food that has been in contact with floodwater or sewage as it may not be safe to eat due to microbial or chemical contamination

What if I start to feel unwell?

- If you feel unwell this does not necessarily mean that you are suffering from any infection. If you are concerned, then call 111. A textphone service is also available if you are deaf or hard of hearing. The textphone number is 18001 111. Alternatively, you may wish to visit your family doctor.
- Avoid contact with floodwater and wash your hands regularly. Swallowing floodwater or mud can cause diarrhoea, fever or abdominal pain. Mention the flood if you see your GP with abdominal complaints that started within 10 days of being exposed to floodwater or sewage contamination.

13 This advice is largely drawn from the PHE Flooding FAQs document available on the PHE website

- Remember that flooding is stressful. It is normal to feel anxious, upset and experience difficulty sleeping. Take care of yourself and your family and check on elderly and vulnerable friends and neighbours. Contact friends and family for support as it can take a long time for life to return to normal.

How do I check if my local health services are affected (eg GPs, outpatient appointments)?

- If you can, use the usual local telephone numbers for your health services.
- Where local health services are affected by flooding check the website or press for details
- Make sure your family take their medicines and attend scheduled medical appointments.

Floods and mental health

Flooding can have profound effects on people's mental health and well-being that may continue over extended periods of time[14]. Distress is a common reaction for people following a flood. However distress is usually temporary; most people are resilient and cope with being flooded despite being distressed by it. Only a minority of people are at risk of going on to develop further mental health problems. If a person's symptoms persist, they should visit their GP who can help to identify further sources of support. Most people's need for support is met by persons close to them. Good social support can protect against the negative psychosocial impacts of being flooded.

While experiencing a flood is the primary cause of stress for people who are affected, it is important to remember that the stress and strain associated with dealing with cleaning up and recovery may also be a problem[15]. This is particularly the case if recovery and rebuilding is managed poorly by responding agencies and private companies. The period after an emergency response has ended and when people must rely on the private sector for continued recovery has been called the "recovery gap". Some examples of the stressors that occur during this time are:

- health-related stressors, such as lack of access to healthcare, new or continuing health concerns or conditions, and lack of access to prescription medications
- family and social stressors, such as a breakdown in household activities and separation from friends

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14 Stanke C, Murray V, Amlôt R, Nurse J, Williams R. (2012) The effects of flooding on mental health: Outcomes and recommendations from a review of the literature. PLoS Currents Disasters. DOI: 10.1371/4f9f1fa9c3cae. Available at: http://currents.plos.org/disasters/article/the-effects-of-flooding-on-mental-health-outcomes-and-recommendations-from-a-review-of-the-literature/

15 Lock S, Rubin GJ, Murray V, Rogers MB, Amlôt R, Williams R. (2012, in press) Secondary stressors and extreme events and disasters. PLOS Disasters.

- stress relating to education and schooling, such as loss of education facilities and loss of socialisation associated with attending school
- feelings of loss of control and personal security, and fear of recurrence of another extreme event
- economic stressors such as problems with compensation, recovery of and rebuilding homes, disrupted transport and daily routines, loss of employment and/or income, and loss of physical possessions and resources
- stress arising from exposure to media reporting

What you can do to support someone who has been affected by floods

The most appropriate approach for managing people who have been affected by flooding is based on "psychological first aid". Psychological first aid is not an intervention but is a set of principles and actions that can be performed by anyone. It consists of humane, supportive responses for fellow humans who are suffering and need support. The World Health Organization's *Psychological first aid: guide for field workers*[16] provides guidance on how to conduct psychological first aid. The key features are:

- first, assess the situation and ensure that a person's circumstances are safe, and help them to make contact with recovery agencies if needed
- check that there are no immediate physical health needs, for example those that may require an ambulance or a hospital visit
- ask about needs and concerns, and identify if any basic needs are not met, such as access to food, water, shelter and medication
- help people to contact their loved ones, and others who can provide familiar sources of support
- help to identify practical ways to address people's needs and access to services
- listen, but do not pressure people to talk about their experiences
- provide information if you have it, and help people to make plans for next steps

It is not recommended that people who are affected, and responders, are offered single session stress debriefing[17], which is sometimes referred to as counselling. Psychological first aid is a more appropriate response in the early stages of recovery.

However, a small minority of people are at risk of developing further mental health problems and they may require specialist mental healthcare. A number of studies have noted increases in the incidence of common conditions such as substance misuse,

16 World Health Organization, War Trauma Foundation and World Vision International (2011) Psychological first aid: Guide for field workers. WHO: Geneva. Available at: http://whqlibdoc.who.int/publications/2011/9789241548205_eng.pdf
17 Rose SC, Bisson J, Churchill R, Wessely S. (2009) Psychological debriefing for preventing post traumatic stress disorder (PTSD). Cochrane Database of Systematic Reviews, Issue 2. Art. No.: CD000560. DOI: 10.1002/14651858.CD000560. Available at: http://www.thecochranelibrary.com/SpringboardWebApp/userfiles/ccoch/file/PTSD/CD000560.pdf

depression, anxiety and post-traumatic stress disorder following flooding. The difference between a person experiencing distress and one who develops further mental health problems depends on a number of factors including the severity and duration of the flood, a person's pre-existing problems, and the overall impact of the flood on each person's life.

What to do next

Flooding can lead to situations in which health, including mental health, can be put at risk, resulting in an increased burden on healthcare services and other agencies in the UK.

Emergency responders: Emergency responders should be mindful of recovery gaps. They should consider the consequences of flooding on mental health, and work with agencies responsible for managing the environments in which people live to support measures which mitigate the effects of flooding on communities.

Social care services: Agencies that are responsible for social care should recognise the vital importance of social cohesion of communities and families before disasters occur, and should support its restoration as soon as possible afterwards. Restoring communications and keeping families together are key to reducing suffering and promoting recovery from flooding.

Healthcare voluntary sector services: All healthcare services and providers should be aware of the distress that flooding may cause for people who are affected. A minority of people who are affected by flooding may develop mental health problems in the medium-to-long term following flooding, or may experience exacerbation of pre-existing mental health conditions.

All agencies should be mindful that some people may have been flooded more than once and there may be cumulative effects of these experiences. Understanding the length of time people have been flooded and how long they have been displaced from their homes will be important in providing support and care. Provision of practical information on the process of insurance claims, loss adjusting, alternative accommodation, building repairs and recommendations for reliable local service providers such as builders can all contribute to reducing the stress of recovery.

Your local health services

Anyone with concerns for their health or mental health should contact their GP for advice, or NHS 111. If you want to check that your scheduled appointment is unaffected (eg GP, outpatient, inpatient at local hospital), use the usual local telephone

numbers for your health services. In more severe circumstances, local NHS services may be issuing updates and NHS Choices is also a good source of local health service information: www.nhs.uk/service-search.

For further advice about the other health impacts of flooding see the PHE website at www.gov.uk/phe. The latest alerts and general flooding advice are provided by the Environment Agency and Floodline (0345 988 1188 or 0845 988 1188).

This information on flooding and mental health is also available as a factsheet: http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1317140780425

Food[18]

Microbes and water-borne infectious diseases can be transmitted in floodwater[19] and contaminate food, food storage and food preparation areas. Furthermore, disruption to power supplies to fridges and freezers due to flooding can result in spoiling of perishable foods.

Is food safe to eat?

- The Food Standards Agency advises people not to eat any food that has been touched or covered by floodwater or sewage. Don't be tempted to try to salvage food that has come into contact with floodwater including tins as they may be damaged or contaminated.
- Do not eat any produce grown on an allotment or garden that has been flooded, unless it has been cooked. So, “ready to eat” produce such as lettuce or strawberries that were in the allotment or garden when it flooded should be thrown away. It is OK to eat produce that is to be cooked, even if it has been contaminated by floodwater, because cooking will kill any harmful germs that might be present. It is also fine to eat produce that is growing above the water and not contaminated with floodwater, eg fruit on trees.
- If you have a catering business and have been affected by flooding, ask for advice from the environmental health service at your local authority.
- If your power has been cut off and your fridge has not been working for up to four hours and has remained unopened, the food inside will be safe. If your fridge has not been working for more than four hours it is advisable to throw away the food inside.

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18 This is advice based on information on the FSA website. http://food.gov.uk/policy-advice/microbiology/flood#.Uv4RNIWZFGw

19 Brown L, Murray V. Examining the relationship between infectious disease and flooding in Europe: a systematic literature review and summary of possible public health interventions. Disaster Health, 2013; 1 (2):1-11.

- If your freezer has not been working throw away any food that has started to get soft, including food that is intended to be eaten from frozen (eg ice cream). Depending upon how full the freezer is, produce can remain frozen and safe for 24 hours or more if the freezer door is left unopened. However remember the maxim "when in doubt throw it out".

How do I prepare food safely?

- Always wash your hands before with warm clean water and soap and dry them especially after going to the toilet, before eating or preparing food and after being in contact with floodwater (including sewage or other items that have been in floodwater).
- Use cold water to wash if warm is not available. If there is no clean water, use disposable soapy, wet wipes to carefully clean all parts of your hands and dry them.[20]
- Remember that water conducts electricity, do not turn on gas or electrical appliances if they may have got wet[21]. Only turn them on when they have been checked by a qualified gas engineer or electrician respectively.
- Clean and disinfect all work surfaces, plates, pans, cutlery, plastic/ceramic chopping boards etc. before using them with food. If you have a working dishwasher and mains water supply, this is a more efficient way to clean and sanitise smaller items. Discard wooden chopping boards and wooden spoons if contaminated by floodwater.
- Thoroughly clean the inside of your fridge and food cupboards if they have been touched by floodwater.
- Do not use contaminated water to wash dishes, brush your teeth, wash or prepare food, wash your hands, make ice, or baby formula.

What do I do with flood-damaged food?

- Put flood-damaged food in black plastic refuse sacks, double bagged if possible, seal and put out when your next refuse collection is due.
- Remember to check with insurers before disposal because food may be insured. Do not be tempted to try to salvage damaged food - including tins as they may be damaged or contaminated.

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20 More information is available here; http://www.hpa.org.uk/Topics/EmergencyResponse/ExtremeWeatherEventsAndNaturalDisasters/EffectsOfFlooding/

21 Menne B, Murray V (Eds) (2013) Floods in the WHO European Region: Health Effects and their Prevention. World Health Organization Europe: Denmark.

- If you have a catering business and have been affected by flooding, ask for advice from the environmental health service at your local authority.

Drinking water

The mains water supply and distribution network is not normally affected by flooding (and has not been during the recent flooding), so it is safe to use the water in the usual way. For private supplies such as a well or spring see below.

Water companies have a duty to take all necessary steps to protect public health. For example, should a water treatment works becomes flooded, alternative supplies will be made available, such as by bottled water or bowser, but in the meantime consumers may be advised to boil water before drinking or temporarily stop using water for domestic purposes.

My mains water tastes, or looks funny – what should I do?

If you notice a change in water quality, such as the water becoming discoloured or a change in taste or smell, or if you are unsure, ring your local water company. While waiting for an answer, and if water is urgently required, boil all water intended for drinking or use bottled water[22].

How do I use tap water that may be contaminated?

- The quality of tap water is the responsibility of your local water company, supervised by the Drinking Water Inspectorate.[23]
- If there is evidence that the tap water may be contaminated, the water company will issue advice to boil the water.

What if my water comes from a private supply?

- If your water is a private supply such as a well or spring, then check that it has not been affected by the floodwater. If a private well or spring has been covered by floodwater, proceed with caution and ring your local authority for advice. While waiting for an answer or if in doubt, assume that the water is unsafe to drink and source an alternative supply.

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22 Kistemann T, Classen, T et al (2002) Microbial Load of Drinking Water Reservoir Tributaries during Extreme Rainfall and Runoff. Applied and Environmental Microbiology 68 (5) 2188 http://aem.asm.org/content/68/5/2188.full.pdf+html
23 Drinking Water Safety at http://dwi.defra.gov.uk/stakeholders/information-letters/2009/09_2009Annex.pdf

- Boiling water kills pathogenic bacteria, viruses and parasites but does not remove harmful chemicals, which is why sourcing an alternative supply is recommended.

I've been advised to boil my mains water – what do I need to know?

Boiling water is one of the most effective ways of sanitising and killing waterborne microbes [24] and is recommended in situations where microbial contamination of drinking water could threaten public health[25].

- There are three kinds of water notices for different circumstances: Boil tap water before use; Do not drink your tap water; Do not use your tap water.
- If you have been advised to boil your water before use, this will be for drinking and food preparation. All water for these purposes should be brought to a boil and then allowed to cool before using. Remember that boiling water can carry a risk of scalding accidents. It is advisable to use a kettle rather than pots and pans. If you must use open containers such as pots and pans, then special care should be taken when young children or vulnerable people are involved. Keep panhandles turned inwards when boiling water in pans so that children cannot reach them. Once boiled water begins to cool it is vulnerable to recontamination from hands and kitchen utensils so it is important that boiled water is used as soon as possible[26].
- Water from the hot tap is not suitable for drinking, whether in flood circumstances or not.

How do I bathe my child without mains water?

If the water company has advised that the domestic supply is unsafe for drinking, then it is also inadvisable to use this for bathing infants as they may ingest some during bathing[27]. In this situation, bottled water, is a safe alternative or you can use baby wipes for hand cleansing and washing infants.

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24 Block SS, 2001. Disinfection, Sterilization and Preservation. Fifth edition. Philadelphia, PA: Lippincott Williams & Wilkins. Cited in: Clasen T, McLaughlin C, Nayaar N, Brisson S, Gupta R, Desai D, Shah, Hl (2008) Microbial effectiveness & cost of Disinfecting Water by Boiling in semi-urban India. Am J Trop Med Hyg 79(3)407-413

25 World Health Organization (2004). Guidelines for Drinking-water Quality. Third Edition. Volume 1 Recommendations. World Health Organization; Geneva.

26 Clasen T, Hao D, Boisson S, Shipin O (2008). Microbiological Effectiveness and Cost of Boiling to Disinfect Drinking Water in Rural Vietnam. Environmental Science and Technology; 43:12.

27 Gamper-Rabindran S , Khan S , Timmins C (2010) The impact of piped water provision on infant mortality in Brazil: A quantile panel data approach Journal of Development Economics 92:188–200

Can I use water for my contact lenses?

Avoid putting contact lenses into water, boiled or otherwise treated as this can lead to eye infections[28].

Toilets and septic tanks

During flooding, both as a result of groundwater, surface water and overtopping of rivers, sewage systems may become inundated by floodwater and this floodwater may become contaminated by pathogenic organisms. However, infection problems arising from floods in the UK are rare. Despite the rarity of such events it is important to be aware of the small risk.

Raw or partially treated sewage may attract domestic animals, vermin and pests which can create an unpleasant environment (odour and sight), but also could be a risk to public health[29].

The Environment Agency and Public Health Engand (PHE) work together. This may include risk assessment of whether significant pollution has been produced by industry or from sewage treatment works and/or additional monitoring of watercourses. Environment Agency monitoring information is shared with PHE as required.

It is important to re-emphasise that washing your hands is the most important way to get rid of harmful bugs. Using warm, clean water and soap, rinsing and and drying hands after going to the toilet, before eating or preparing food, after being in contact with floodwater, sewage or with items that have been in the water is the most effective way of preventing infection. Use cold water to wash if warm is not available. If there is no clean water, use disposable soapy, wet wipes or sanitising gel to carefully clean all parts of your hands and dry them.

What if the toilet can’t be flushed at all because of blockage?

The following options may be available to householders whose toilets cannot be used:

- it may be possible and practicable to use the facilities of unaffected family, friends, neighbours, public toilets, rest centres, local shops, supermarkets and hotels. Chemical toilets ("portaloos") may be provided in your area

28 Kilvington S, Gray T, Dart J, Morelet N, Beeching J, Frazer D, Matheson M (2004). Acanthamoeba Keratitis: The role of domestic tap water contamination in the United Kingdom. Investigative Ophthalmology and Visual Science; 45:165-169.
29 Harvey P, Baghri S, Reed B. Emergency Sanitation: Assessment and programme design. Chapter 6 Excreta disposal. Available at: http://ec.europa.eu/echo/files/evaluation/watsan2005/annex_files/WEDC/es/ES06CD.pdf

- portable bag in bag products (eg "Brief relief", "wag bag") designed for solid and urine waste may be provided in your area. Once used according to manufacturers' instructions, the waste bag should be placed inside another bag, such as a bin liner, and disposed of in the usual way

Septic tanks

If you live in a flood-affected area and floodwaters have affected your property, and have a septic tank system (also known as an onsite wastewater system), this may also be affected.

Wastewater from your home contains sewage from your toilet and grey-water from your bathroom, kitchen and laundry. Wastewater can contain human disease-causing micro-organisms such as bacteria, viruses and parasites. Diseases can be transmitted to humans from wastewater if appropriate measures are not taken although this is very rare if safe hygiene measures are followed. The safe disposal of wastewater is an essential part of protecting your health and the health of others. Ensure children and pets are kept away from wastewater affected areas.

The advice in the Environment Agency note, ‘’Dealing with Septic tanks during flooding’, sets. out advice for members of the public and operators responsible for dealing with septic tanks during flooding, with suggestions for what immediate action can be taken if the septic tank is waterlogged and will not drain[30]. In addition it sets out other options for action in the short and longer term. It also highlights sources of further information.

How will I know if my septic tank system has been affected?

Septic tank systems typically comprise a concrete, plastic or fibreglass tank. In a functioning system, the solids in the wastewater settle in a primary tank, the wastewater is then discharged through pipes into soil in a designated area on your property often called a soakaway or drainage field.

Failed systems are not easy to identify, however some simple indications may include:

- a pungent odour around the tank and land application area
- blocked fixtures and wastewater overflowing from the relief point
- high sludge levels within the primary tank
- sewage flowing up through the toilet and sinks

For septic tanks affected by floodwater – recommended immediate, short and long-term actions are:

30 Available at www.environment-agency.gov.uk/homeandleisure/floods/151932.aspx

Immediate actions

While there is general flooding in your area:

- while a flood is in progress homeowners are advised to eliminate all non-essential water use and flush toilets as little as possible. Continue to do this until the ground is no longer flooded. The Waterwise website has quick tips on reducing water use in the home[31]
- although this is unlikely to be sustainable in the long term, it may be necessary to arrange to have your septic tank emptied and the contents removed by a contractor on a regular basis until the ground is no longer flooded
- before having your tank emptied get advice from your drainage contractor as in some circumstances emptying the tank can cause mud or silt to be drawn into the tank or, in extreme cases, result in it lifting out of the ground

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If your septic tank system becomes covered with water:

- if the area where your septic tank and/or drainage field is located becomes covered with water, if possible do not use the system at all and avoid contact with any standing water that may contain sewage. Continue to do this until the septic tank and/or drainage field is no longer covered in water and make arrangements to have your tank emptied if the situation allows (see above)
- consider hiring temporary portable toilet services
- if you see pollution please report it to the Environment Agency incident hotline 0800 80 70 60 (Freephone, 24 hour service) so that a team can investigate and take the appropriate action

Short-term actions are:

- ensure there are no surface water or clean water connections to the dirty water system. This will reduce effluent volume. It is usually acceptable to dispose of clean surface water via a drainage field or stream without treatment
- keep away from the septic tank drainage area, as standing water/wet ground/ponded water may contain untreated sewage. Avoid doing works until the ground conditions are suitable
- if you have put caustic or toxic chemicals in your septic tank in the past, and your system backs up into your cellar, basement or drainage field, be especially careful to protect your eyes, skin and lungs from the fumes
- if sewage has backed up into the house clean the area and disinfect the floor. Use a household bleach based detergent (according to manufacturer's instructions) to

31 Available at www.waterwise.org.uk

disinfect the area thoroughly[32] have your septic tank professionally inspected and serviced if you suspect damage. Only trained specialists should clean or repair septic tanks because tanks may contain dangerous gases[33]
- for composting toilets or other similar approved systems, contact the manufacturer for specific advice on how flooding or power outages may affect these systems

Recommended long-term actions are:

- consider connecting to the public foul sewer if possible. Your local sewerage undertaker will be able to provide details on applications for this connection
- keep your system well maintained, so it is better able to cope in extreme weather
- consider more appropriate siting of the septic tank and soakaway, away from areas associated with flooding/waterlogging if available
- consider an improved treatment option which can be discharged directly to surface water, removing the need for an infiltration system. For further information please contact the Environment Agency National Customer Contact Centre (NCCC) on 03708 506 506, and visit the Environement Agency website for guidance on environmental permits

After the flooding event:

- inspect the septic tank system for signs of damage and to determine if removal of silt or debris is required, then take any actions required. An appropriately qualified contractor may be needed to inspect and take action
- where surface water or groundwater flooding results in pollution or amenity problems from septic tanks or package treatment plants serving more than one property, and where these cannot be overcome by repairing or maintaining your existing system, your sewerage undertaker may have a duty to provide a public sewer under s101A, Water Industry Act 1991.

Further information on wastewater treatment systems is available on the British Water website[34]. The Environment Agency website also has advice on the treatment and disposal of sewage where no foul sewer is available[35].

32 Adapted from US advice available here; http://www.scdhec.gov/environment/envhealth/septic/flooding.htm
33 Knight LD, Presnell SE. Death by sewer gas: case report of a double fatality and review of the literature. The American Journal of Forensic Medicine and Pathology [2005, 26(2):181-185]
34 http://www.britishwater.co.uk/publications/publications_and_technical_guides.aspx
35 http://a0768b4a8a31e106d8b0-50dc802554eb38a24458b98ff72d550b.r19.cf3.rackcdn.com/pmho0706bjgl-e-e.pdf

External environments

Gardens and play areas

- Do not let young children play on affected grassed or paved areas until they have been cleaned down and restored to their normal condition.
- Sunlight and natural processes in soil help destroy harmful bacteria and any excess risk to health should disappear within a number of weeks or so. (The best way of protecting health is always to wash your hands before eating or preparing food)

Sports playing fields

- In the course of flooding in the UK, sports playing fields and pitches can become inundated with floodwater that may be contaminated with sewage and chemicals (normally at low concentrations). Therefore, during the recovery phase it is important to assess whether there may be any public health implications from contamination on these pitches after the floodwater has receded and drained away.
- Many affected sports fields have been subject to flooding regularly over recent years and some have deliberately been sited on land in the floodplain that cannot be used for development.
- Normal soil on playing fields and pitches will contain bacteria and fungi, some of which are usually associated with sewage, therefore testing the soil for contamination will not add any useful information when determining the risk to public health. Although the risks cannot be completely eliminated, and some pathogens may survive in low numbers in soil for some weeks, these do not generally pose a significant threat to health. The risks of infection therefore remains low, and people using these pitches are routinely advised to take basic hygiene precautions (including washing hands after playing, before eating or drinking, thoroughly washing any cuts incurred on the field with clean water, covering cuts before playing and keeping their tetanus immunisation up-to-date). Any additional micro-organisms deposited by the floods could be expected to decay rapidly as the pitch dries out in sunlight.
- Where sports fields and pitches have been flooded, gross contamination (litter, rubbish etc carried in by the flood) should be removed. Wear protective clothing – waterproof boots, plastic apron and gloves – while cleaning up. Cover any open cuts with waterproof plasters. Wash your hands with soap and water after being in contact with floodwater or items that have been contaminated and always wash your hands before eating or preparing food. Following this, the appropriate action to return the pitch to a good playing condition should be carried out according to professional advice.

- If a playing field has been subject to specific contamination, for example due to an overflowing septic tank or floodwater coming directly from an obvious specific chemical source, then an individual risk assessment should be carried out with advice from the specialist agencies including PHE, the local authority and Environment Agency. The risk assessment should be completed before any testing is carried out and the decision whether to test is an outcome of the risk assessment.
- Appropriate remedial action (if any) will be determined on the basis of the risk assessment with professional advice from PHE, the local authority and Environment Agency.

Potential chemical hazards involved in floods and cleaning up

Carbon monoxide poisoning

Following a flood some people consider using outdoor equipment such as petrol or diesel powered tools, camping stoves and generators inside for drying, heating, cooking, and power supply.

However petrol or diesel generators and other fuel driven equipment (including fuel-driven DIY equipment) should never be brought indoors or other enclosed spaces. It is advisable to place equipment outdoors 20 feet or at a safe distance from air entering the building, with the exhaust facing away from windows or doors (air intakes) so the exhaust gas is not drawn indoors [36]. The exhaust gases contain carbon monoxide which can quickly build up to poisonous levels without good ventilation which involves keeping doors and windows open whenever possible.

Carbon monoxide (CO) is produced when fossil fuels such as gas, petrol, diesel, coal, coke, oil and other fuels such as wood and charcoal burn without enough air. Incorrectly installed, poorly maintained or poorly ventilated heating and cooking devices are the main sources. Exposure to high indoor levels can be fatal, while exposure to lower levels can result in symptoms that resemble flu, viral infections or food poisoning. Headache, tiredness, difficulty in thinking clearly and feeling sick are the most common symptoms. Drowsiness, dizziness, shortness of breath and chest pains may also be experienced. Prolonged exposure to low levels of CO over a long period of time can cause harm to health, often leading to lasting neurological damage in victims [37].

36 Further information on the distance of generators from homes can be found at; http://www.cdc.gov/niosh/docs/96-118/
37 Further information and advice on carbon monoxide can be found at http://www.hpa.org.uk/Topics/ChemicalsAndPoisons/CompendiumOfChemicalHazards/CarbonMonoxide/

It is important to have all appliances which use fossil fuels (and wood) installed and serviced at least annually by a suitably qualified, reputable and registered engineer, and that they are operated according to the manufacturers' instructions. Do not turn on appliances which use fossil fuels (and wood) if they may have got wet until checked by a qualified engineer.

Carbon monoxide monitors can be placed in the area where potential sources of CO exist. These monitors should be equipped with audible alarms to warn people when CO concentrations are too high. However, these alarms should not be seen as an alternative to following the above guidance or the use of caution.

Car batteries

Car batteries are usually the lead-acid type which contain 35% sulphuric acid. They may be covered by floodwaters and their safe handling in recovery is important; older batteries may leak acid, so it is advisable to use rubber gloves when handling them. Car batteries are normally disposed of via civic amenity sites.

Household chemicals

Floodwater may have displaced containers of hazardous chemicals such as cleaning products, garden pesticides and domestic heating oil from their normal storage places in the home. Wear rubber gloves to handle any of this packaging. Further information, particularly on domestic heating oil spills, is available on the PHE website[38].

Oil in floodwater

Oil films may be seen floating on the floodwaters both inside buildings and surrounding areas. It is recommended that these films should not be disturbed and exposure to them should be avoided as skin exposure may cause a variety of skin conditions[39]. Floodwaters should be allowed to subside and any remaining oil contamination in accessible areas in domestic settings can be removed by using a detergent solution and washing the surface down after initial cleaning has been carried out. In inaccessible areas such as under floorboards it may present an odour problem but is not necessarily a health hazard. Further advice should be sought from environmental health staff if the odour persists or if you are particularly concerned about it for other reasons. Oil pollution and other contaminants can also be reported to the Environment Agency pollution incident freephone number 0800 80 70 60 (24h service)

38 http://www.hpa.org.uk/web/HPAweb&Page&HPAwebAutoListName/Page/1284475666999 [accessed 17 February 2014].
39 http://www.hpa.org.uk/web/HPAweb&Page&HPAwebAutoListName/Page/1284475666999 [accessed 17 February 2014].

Petrol in floodwater

Petrol films may be seen floating on the floodwaters both inside buildings and surrounding areas. It is recommended that these films should not be disturbed and exposure to them should be avoided as skin exposure may cause a variety of skin conditions and the vapour may be irritating to eyes and lungs[40]. Floodwaters should be allowed to subside and on contact with the ground the petrol allowed to evaporate. As is normal practice people are reminded not to smoke or have fire sources such as matches in the vicinity of petrol films.

Ventilation of enclosed areas

Avoid enclosed areas that may be chemically contaminated, such as garages and cellars where concentrations of fumes may build up once the flood waters have receded. Before entering, ensure such confined areas have good ventilation, with doors and windows open, and do not allow children and animals to enter.

Gas and electrical systems

Do not turn on gas or electrics if they may have got wet. Only turn them on when they have been checked by a qualified gas engineer or electrician respectively.

Disposal of sandbags

This advice is from the Environment Agency website [41]:
“Sandbags tend to retain contaminants such as sewage and oils when they come into contact with floodwater. Ensure you wear gloves and wash hands thoroughly after handling. If sandbags are contaminated by floodwater you should take them to you local civic amenity site and inform the staff that they have been contaminated. Where this is not possible you should seek advice from your local authority as to whether any other options are available to dispose of the sandbags. Do not place full sandbags or the sand in your household waste. Do not allow children to play with the sand or place it in sand pits due to the risks from possible contamination.
If in doubt, contact your local authority environmental health department for advice and the location of your nearest civic amenity site.”

The sandbag disposal advice on the Environment Agency website for local authorities is as follows: “Unused sandbags are not regarded as waste. Bags are best stored empty and dry. Used sandbags, that have come into contact with floodwater, are regarded as

40 http://www.hpa.org.uk/webw/HPAweb&Page&HPAwebAutoListName/Page/1190384328566 [accessed 17 February 2014].
41 More information on the disposal of contaminated sand-bags is available; http://www.environment-agency.gov.uk/homeandleisure/floods/31644.aspx

waste. Local authorities should be familiar with disposal options. For uncontaminated sand the likely disposal route will be through normal inert waste routes (usually inert waste landfill). For uncontaminated bags, made of compostable material, such as hessian, they can go for composting. Those made of non-compostable materials such as polypropylene, should be recycled if possible, or disposed by incineration or landfill. Sand and bags contaminated with hazardous substances, such as oil, are likely to need disposing of as hazardous waste."

If sandbags need to be stored temporarily while awaiting disposal it is best to lay them out so they can dry rather than stacking them. It is highly unlikely there is any risk of microbial infection during the drying out process but it is best to chose an area away from pets and children, preferably in direct sunlight to hasten the weathering process.

Afterwards (living in your flood-damaged home)

Living in your flood-damaged home

- Stay with friends or family, or ask your local authority to help you find alternative accommodation if your home has been damaged by floodwater.
- Only return to your home when essential repairs and cleaning have been completed.
- If you have gas or oil central heating and it has been checked by an engineer, turn it on. Keep the thermostat between 20-22 degrees centigrade for steady drying.
- If you are drying your property naturally, keep doors and windows open as much as possible. If using dehumidifiers, close external doors and windows. If dehumidifiers are powered by generator make sure the generator is outside at a safe distance from building air intakes.
- Ensure that if you have air bricks to any under floor spaces that these are unblocked to give cross-ventilation to these areas. As floorboards and walls continue to dry out, any loose material and dust resulting from this should be vacuumed up on a regular basis.

Other practical information about reoccupying your flood damaged property and restoring it to a home can be found on the Construction Industry Research and Information Association (CIRIA) website[42] and latest government flood support schemes can be found on the government website[43].

42 http://www.ciria.org.uk/flooding
43 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/283232/Flood-Support-Schemes-guidance.pdf

Mould

Mould and fungal spores are common and we are constantly exposed to these spores as part of normal everyday living. The main key to controlling mould is to control the moisture levels in the environment. Hence after flooding:

- you may notice mould growing on damp walls. This will stop growing as your home dries out
- heating, dehumidifiers and good ventilation can help dry out your home.
- small areas of mould can be removed easily with proprietary mould removal solutions available in hardware stores. If the mould persists or is extensive it may be advisable to contact a specialist cleaner. If you choose to contact a specialist cleaner to help remediate an extensive mould problem, it is important that they have experience in the field of fungal remediation, and follow current guidance[44]

Most people will not encounter any health problems as we are constantly exposed to mould and fungal spores as part of normal everyday living. However, if you believe that you have extensive fungal growth in your property and that your health might be affected, you should consult your GP. It is important to note that there is medical evidence linking prolonged exposure to high levels of mould with exacerbation of asthma and eye/nose irritation in some individuals.

Keeping pets safe[45]

Infections in pets during and after periods of flooding in this country are very rare and usually any harmful bacteria in floodwater become very diluted and present a low risk. However, swallowing floodwater, mud or, most importantly, rubbish/foreign materials that have been brought in to the garden by the flood waters, can cause stomach upsets or diarrhoea. There are a few precautions to be aware of which should prevent health problems:

- avoid direct contact with floodwater and prevent your pet from drinking flood water (running or standing water). If there is still a significant amount of water in the environment, keep your dog on a lead or limit access to the garden and public land as much as possible until the water has receded
- keep pets out of the affected area until clean-up has been completed – ensure that you remove all obvious signs of contamination and any accumulated rubbish once the flood water has receded before allowing your pet free/unsupervised access to the garden
- clean away mud and dry your pet well after outdoor access and wash your own and your children's hands frequently when handling a pet that has been outdoors

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44 WHO, 2009 available at http://www.euro.who.int/__data/assets/pdf_file/0003/78636/Damp_Mould_Brochure.pdf
45 Further information is also available at www.gov.uk/animal-welfare-in-severe-weather

- ensure your pets vaccination and deworming is up to date. Contact your local vet if you need advice and more information

Rats and other pests

- Rats can move into homes due to flooding of their nests, but they are generally wary of humans. If normal waste collection services are disrupted for any reason, the build-up of waste may attract rats and other pests.
- Store your rubbish in hard bins, or if this is not possible, try to keep rubbish bags in a place away from your home.
- If you handle rubbish bags that you think rats may have contaminated with urine or droppings, wash your hands thoroughly with soap and water.
- Avoid approaching or cornering rats. If you are bitten by a rat then seek medical advice, and be sure to mention the exposure to rats.
- If you have to pick up a dead rat, wear gloves and dispose of the rat in a plastic bag. Wash your hands thoroughly with soap and water afterwards.

Dealing with damaged outbuildings containing asbestos

- Flood clean-up may involve renovation, removal, demolition or salvage of flood damaged structures and materials. Such materials may contain asbestos.
- Contact your local authority as they will be able to advise on the best method for disposal, as materials such as sprayed asbestos coatings, asbestos insulation, asbestos lagging and asbestos insulating board should only be removed and disposed of by a licensed contractor.[46]
- Specialised licensed asbestos removal companies will be able to undertake specialist removal, these will be listed in your local telephone directory.

46 HSE available at http://www.hse.gov.uk/asbestos/faq.htm