Ministry of Defence

INFORMATION NOTE

EMBEDDING CLIMATE RESILIENCE IN HEALTH & SAFETY MANAGEMENT

Number: IN 06/12

Sustainable Development

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Who Should Read this: Commanding officers, Line Managers, H&S advisors, BC managers, CESO, but ultimately all staff should be aware	
When it takes effect: Immediately	When it is due to be updated: Sep 2015

DOCUMENT AIM

1. This Information Note (IN) supports the Practitioner Guidance 01/12 Building a Climate Resilient Estate.

2. This IN aims to raise awareness (including signposting documents) of the weather-related health and wellbeing risks that are likely to become increasingly important and/or more challenging to manage, that may need extra resources or that may happen at the unexpected time of the year e.g. during 2011 heatwaves occurred in Apr and Sept.

3. The potential & increasing risks identified in this IN should be assessed at establishment level as part of existing workplace and activity risk assessments and H&S procedures, including those by LM, to establish the extent of hazard and risk and whether risks are likely to increase due to the regional / local changes in climate.

INTRODUCTION

4. The UK is projected to experience more unpredictable extreme weather ranging from floods, droughts and freezing winters[1]. Data obtained from the UK weather stations since 1914 shows that the UK climate has already been changing[2]. The UK Climate Change Risk Assessment (CCRA) 2012 has assessed the main projected threats and opportunities arising from changes in the UK climate over the short, medium and long-term and has identified that the UK is already vulnerable to extreme weather, including flooding and heatwaves, and action to increase resilience needs to start to be taken in the short term (by 2020s).

5. Changes in climate and rises in the frequency and intensity of extreme weather events are likely to increase the incidence of health issues such as heatstroke, food poisoning, flood and storm related injuries, vector-borne and water-borne diseases, ozone related respiratory issues, and skin cancer[3].

6. The Armed Forces are used to operate in extreme climates overseas. However UK assets and infrastructure, networks and systems, processes are not always designed / built to withstand weather extremes, which can have impacts for health and safety.

7. People's behaviours can make them more prone to the risks. Raising awareness of the risks likely to be exacerbated by climate change will help increase resilience to the risks.

8. It is MOD policy that all MOD establishments have Site Resilience Plans (see JSP 503). Resilience draws on risk management practices in other processes and activities including health and safety.

INCREASED RISK OF TEMPERATURE EXTREMES

9. Despite the long-term trend towards warmer weather, very cold snaps are still possible. Changes in global average temperatures can mean much larger changes regionally, with greater extremes. Research by the Met Office identified that for a 2°C global increase, the hottest average day temperatures in a UK summer could increase by up to 8°C. For example:

    a. In 2003 the UK experienced a cold snap with heavy snow in Jan and a heatwave in Jul – Aug. Overall, 2003 was 0.61°C warmer above the global average and 0.92 °C warmer above the UK average, however maximum temperatures recorded during 2003 reached 38.5 °C in Kent which is about 16 °C higher than its mean daily maximum of 22.5 °C.

    b. Dec 09 – Jan 10 was particularly cold for the UK but in other parts of the world temperatures were warmer that normal with up to 10°C higher in some parts of Canada.

10. The UK Climate Impacts Programme (UKCIP) and CCRA findings indicate that the UK has already experienced an increase in the frequency and duration of heatwaves and warm spells. The UK Climate Projections 2009 (UKCP 09) and the CCRA project rises in extreme temperatures as well as increased occurrence of hot days (exceeding 25 and 28°C) nationwide, particularly in south east England. Night time temperatures are also projected to increase, further exacerbating the risk.

11. According to the Department of Health (DH), heat-related illnesses include respiratory and cardiovascular diseases (generally affecting vulnerable groups); heat cramps caused by dehydration and loss of electrolytes (often following exercise / physical exertion under the sun); heat rash; heat oedema (mainly in the ankles); heat syncope (dizziness and fainting e.g. due to

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[1] http://www.defra.gov.uk/publications/files/climate-resilient-infrastructure-full.pdf
[2] UK Climate Impacts Programme Trends report
[3] http://www.parliament.uk/documents/post/postpn232.pdf; http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_082836.pdf

dehydration); heat exhaustion (due to water or sodium depletion, can be exertional) and heatstroke (medical emergency, occurs when the core body temperature rises to 41.1 ^{o}C or higher due to extreme heat, high humidity, vigorous physical exertion under the sun).

12. Climate projections also indicate a decrease in cloud cover. A greater likelihood of warm sunny weather is likely to increase the frequency of air pollution episodes.

13. These issues are likely to increasingly affect outdoor workers whose welfare will need to be considered through regular review of their activities. CCRA also identifies that building overheating will pose an increased risk to building occupants.

Cold temperatures

14. UK climate data indicates that on average winters have already become warmer in the UK and UKCP09 projects that on average winters will be warmer in the short and long term. However, as indicated in paragraph 10, cold snaps are still possible and may occur at unexpected times of the year.

15. Some studies indicate that with climate change reduced Arctic sea ice cover may drive more cold and snowy winters in Europe (e.g. research by the Met Office and the NOAA/Pacific Marine Environmental Laboratory) and that both cold and hot temperature extremes are likely to alternate more often (e.g. Spanish assessment of health risks under climate change Global Change Spain 2020/2050).

16. Current computer modelling can not identify whether the frequency of cold weather extremes is likely to increase or decrease. As the current level of uncertainty regarding cold snaps is high, establishments should monitor the risk in order to be able to evaluate in the future whether it presents and increasing or decreasing risk.

Signposting documents

17. DH Cold Weather Plan for England.

High outdoor environmental temperatures

18. JSP 539 Climatic Injuries in the Armed Forces identified high ambient temperatures as a health risk when undertaking military training. JSP 539 identifies temperature thresholds and duration and intensity of military training activity. With increased frequency, intensity and duration of heatwaves the temperature thresholds identified are likely to be breached more often. However, these may also provide opportunities for training in a hot environment whilst taking the appropriate risk preventative measures e.g. drinking plenty of water, use of sun block and replenishing electrolytes.

19. According to the UK CCRA Health Report changes in solar UV exposure associated with climate change have been linked to skin cancer incidence. There is also a potential increased risk of sun-burn and cataracts. In the UK a rise in the incidence of malignant melanoma has been observed e.g. Scottish Government Climate Change Adaptation Health and Wellbeing Sector Plan, identified that in Scotland the incidence of malignant melanoma more than double from 1988 to 2008. According to research undertaken in Spain (UV Radiation and Climate Change – Health effects) on data published by the International Agency for Research on Cancer the incidence of skin cancer is higher in European northern countries than in European southern countries with Spain having one of the lowest rates in Europe, probably due to the skin type of the Spanish population (see Table 1).

20. As identified by the UK CCRA Health Report, the relationship between future incidence of skin cancer and environmental conditions is extremely complex and influenced by people's behaviours

including increase in leisure time expend outdoors, foreign holidays and use of sun beds. Personnel need to be aware of these risks to minimise the risk from behavioural exposure.

21. Higher environmental temperatures and increased UV are likely to increase the strain on those civilians working outdoors, undertaking more manual tasks or undertaking hot work (welding etc.). Standard risk assessments for civilian activities should also consider these issues so that staff are aware and take appropriate preventative actions e.g. use appropriate clothing and sun block, avoiding caffeinated drinks and drinking more water than normal.

22. Both, military and civilian estate users will need to check the Met Office heatwave warnings and advice (available from 1 Jun to 15 Sep) known as Met Office heat-health watch service prior to a risk assessment being undertaken and take account of the Heat Stress Index, supported by use of the Heat Stress Monitor, within risk assessments and control measures.

Table 1 Skin type and sensitivity to sunburn and skin cancer risk. Adapted from EU classification of skin photo types based on susceptibility to sunburn in sunlight and Camps and Aliaga classification of skin types and sensitivity to sunburn and skin cancer.

Skin Photo Type	Characteristics	Skin type	Sunburn Susceptibility	Skin Cancer Risk
I	Very fair skin, with freckles, red or blonde hair, fair colour eyes	Always burns and never tans	High	High
II	Fair skin, blonde or red hair individuals with sensitive skin	Burns quickly, tans with difficulty / slowly	High	High
III	Fair dark-complexion with sensitive skin, fair with any eye or hair colour	Burns moderately, tans gradually and uniformly	Moderate	Moderate
IV	Fair dark-complexion skin with dark eyes and hair	Burns quite little, tans quite a lot	Low	Low
V	Dark brown / Dark-complexion, little sensitive	Rarely burns, tans intensively	Very low	Minimum
VI	Very dark-complexion and black	Never burns, always tans	Extremely low	Very low

Overheating in buildings

23. The roll out of the Climate Impacts Risk Assessment Methodology (CIRAM) across the MOD estate has identified overheating in buildings as a common issue during sunny and warm weather on the establishments assessed to date, especially on glazed buildings, modular and re-locatable accommodation and hangars. Establishments at greatest risk are likely to be those establishments located in urban areas (due to the urban heat island effect, see Figure 1).

24. Warm and humid nights could present a greater risk to body's recovery which normally takes place at this time. This issue has been identified at some MOD accommodation blocks and could further increase the risks to health and wellbeing.

25. The inability to provide reasonably comfortable or safe temperatures may cause reduced working efficiencies and the closure of workplaces. In addition, productivity could be affected. According to the Centre for Economics and Business Research (CEBR), productivity falls by 8% at 26 °C, by

29% at 32 °C and by 62% at 38 °C. The respective costs to the UK economy of these reductions in productivity have been estimated by CEBR to be as £35m, £126m and £270m per day.

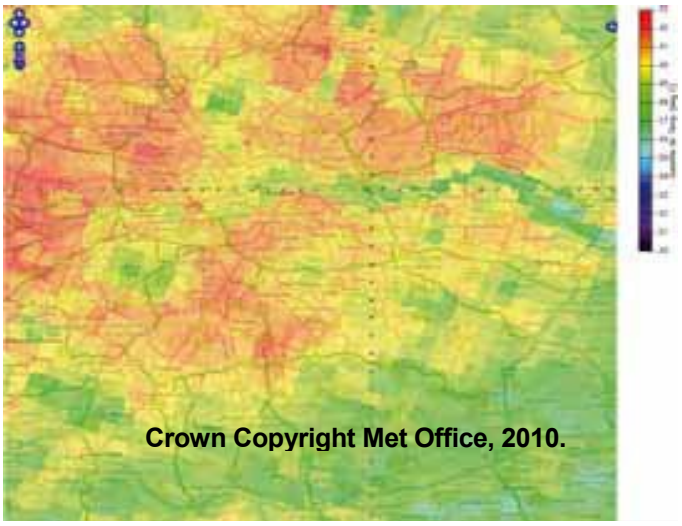

Figure 1 Satellite map of London during the heatwave 2006. Higher temperatures were recorded in areas further away from green spaces with significantly cooler areas surrounding the reservoirs near Heathrow airport, along the River Thames, at Richmond Park and Hampstead Heath. This has implications for other business areas e.g. the design of the built environment (Source: Heatwave Plan for England 2011).

26. Demand for a cooler working environment by mechanical means will result in an increase in energy consumption thus placing MOD at risk of failing to deliver government targets.

27. H&S advisors are encouraged to sign up to Met Office heatwave warnings and advice (available from 1 Jun to 15 Sep) and re-distribute information around the site on how to keep safe when a heatwave has been forecasted. For example, at Northwood PJHQ information is provided on how to keep hydrated. Met Office warnings also include information on high overnight temperatures.

28. Line Managers (LM) can exercise their authority to send staff home if conditions are unsuited to their health or wellbeing. LM could also explore opportunities to change working hours/activities and work location when a heatwave is forecast. Dress code could be relaxed e.g. use of shorts.

29. In addition to raising awareness, there are other options that could help establishments manage these risks including:

    a. Monitor levels of interior comfort for high temperatures as part of routine inspections of buildings and work sites (e.g. Building Management Systems and building inspections) to assess the level of risk within buildings – according UKCIP and Arup guidelines most people begin to feel uncomfortable between 25^{o}C (77^{o}F) and 28^{o}C (82^{o}F);

    b. If monitoring identifies unhealthy indoor temperatures as a recurrent issue, consider in the Integrated Estate Management Plan (IEMP) or equivalent the need to:

        (1) Move location of rooms at risk (i.e. their function) or re-locate personnel / assets;

        (2) Improve maintenance e.g. incorporate solar shading (brise soleil), paint roofs white;

        (3) Create and/or maximise the use of green space and shade;

        (4) Ensure new builds are designed to stay cool during hot weather throughout the expected life of the building.

Signposting documents

30. The Department of Health (DH) have developed a Heatwave Plan for England 2012 which provides guidance on heat related illness, how to increase resilience to the impact heatwaves and extreme heat and advice to be considered during heatwaves.

31. The Health and Safety Executive (HSE) has developed guidance documents covering heat stress in the workplace issues and health risks from working in the sun.

Air quality

32. Increased likelihood of warm sunny weather is likely to increase the frequency of ground-level ozone, nitrogen dioxide and particles pollution episodes (smog). Ozone levels will generally be highest in sub-rural and rural areas, see Figure 2.

33. Exposure to high concentrations of ozone can cause irritation to eyes, nose and throat, coughing, congestion and migraine. Very high levels can damage airways leading to inflammatory reactions. Ozone reduces lung function and increases incidence of respiratory symptoms. Ozone can also aggravate asthma and increase people sensitiveness to allergens that cause asthma attacks. Exposure over several hours may lead to damage of the lining of the airways.

34. These issues are likely to exacerbate respiratory issues among vulnerable groups (e.g. smokers) but ozone will also affect healthy individuals undertaking physical activities outdoors. Chances of being affected increase the longer people take activities outdoors during ozone peak level periods (the hottest period of the day) and when undertaking more strenuous activities.

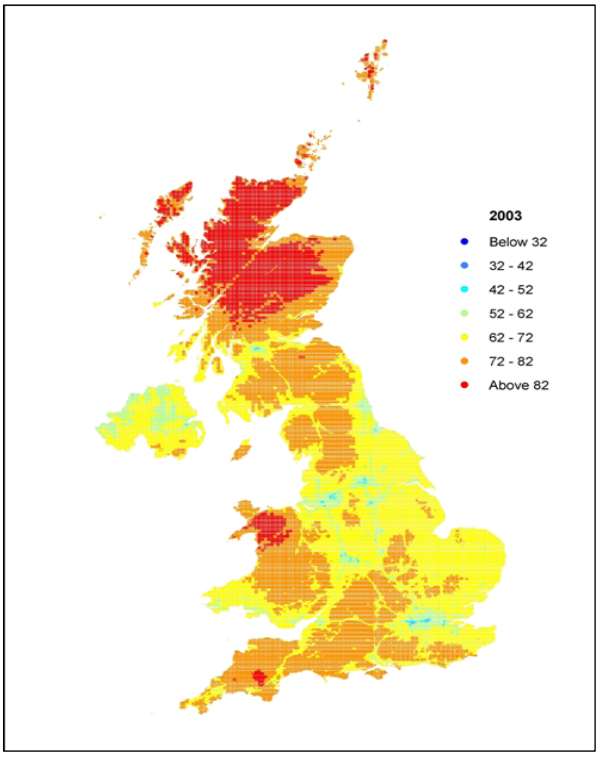

Figure 2 Annual mean of the daily maximum of the running eight hour mean ozone concentration (µg/m3) during 2003 Heatwave with upland areas tending to have the highest levels of ozone. 13 MOD major training areas are located in the uplands

35. According to the Committee on the Medical Effects of Air Pollutants (COMEAP), ozone may also increase the sensitivity in people susceptible to allergens. Allergic reactions are also likely to increase in itself due to increases and changes in types of pollen, mites, mould, spores and other aeroallergens and extended pollen seasons.

36. Both, military and civilian estate users are encouraged to sign up to the UK Air Information Resource and the Met Office pollen warnings and advice and take this information into account within risk assessments as they do for other inclement weather-related risks. It is possible to subscribe through the website to email bulletins for pollution forecasts and latest pollution information. Exposure to air pollutants should be minimised, but if the activity needs to continue, personnel should be made aware of the risks and the need to inform LM if they develop any of the symptoms.

Signposting documents

37. The UK Air Information Resource also provides health advice according to current levels and forecasted levels of air pollution.

INCREASED RISK OF FLOODING

38. Changes in rainfall patterns will result in increased risk of flooding. There is evidence that all the UK regions have experience an increase over the past 45 years in the contribution to winter rainfall from heavy precipitation events. Climate projections indicate that the number of rain days

will decrease but rainfall amounts will increase, in both winter and summer. This will lead to more intense rainfall events that can result in flash floods, sewerage systems failure and landslides also in the summer months.

39. Flooding can cause site contamination (e.g. due to flooding of sewage systems or agricultural land nearby) increasing the risk of diseases on the establishment e.g. from poisoning or infection. Flooding will also increase the risk of contamination of waterways (e.g. due to flooding of interceptors, chemical storage areas etc.).

40. There is a potential impact from flooding and possible subsequent ground and water contamination.

41. It will be important for establishments to assess and manage these risks and also ensure emergency and resilience plans minimise the risk of pollution on and off site. If flash / surface water floods are a recurrent issue, consider materials used in surfacing / resurfacing.

Signposting documents

42. The Health Protection Agency (HPA) related pages provide information on the health risks of floods and advice following a flood event.

PESTS & DISEASES

Pests

43. Changes in the frequency and intensity of both low rainfall and heavy rain and likelihood of higher temperature episodes are likely to increase the population and range of certain pests including flies, mosquitoes, ticks and rats with increased risk to staff of vector-borne diseases. For instance, the number of Lyme disease cases (carried by ticks) is projected to increase in the UK, a rise has already been observed in the number of cases identified by the Health Protection Agency, which have more than doubled from 2001 – 2011[4].

44. Increased temperatures may also increase rat numbers in lakes and water courses whilst increased likelihood of flooding may displace them from the habitat and bring them in closer contact with humans. Increased rat numbers and the change to their habitat is likely to exacerbate the risk of diseases carried by rats e.g. Weils disease (Leptospirosis) in personnel training in lakes.

45. The increased likelihood of these risks need to be considered when undertaking risk assessments and staff potentially exposed to those risks must be made aware of them and of the controls required to be implemented to prevent exposure.

Water-borne diseases

46. Water-borne diseases risks are also likely to increase e.g. The Chartered Institute of Environmental Health (CIEH) report Climate Change, Public Health and Health Inequalities identifies that pipes and reservoirs are more vulnerable to micro-organisms during frequent drought. Evidence reviewed by the CCRA Health report indicates that both low rainfall and heavy rain have preceded drinking water-borne outbreaks in England and Wales, e.g. of

[4] See Table 1
http://www.hpa.org.uk/Topics/InfectiousDiseases/InfectionsAZ/LymeDisease/EpidemiologicalData/lymLymeepidemiology/

cryptosporidiosis. This could increase the risk of water-borne diseases in staff using surface waters (inland and coastal).

47. Increased ambient temperatures also have the potential to affect temperatures in water systems, especially those infrequently used, which may promote proliferation of Legionella. This is an existing risk likely to be exacerbated by the increased occurrence of hot days nationwide. The additional significance of risk will need to be assessed and taken into account in the site Legionella management assessment review arrangements taking into account the specific circumstances at the time.

Food poisoning

48. Food poisoning is frequently caused by bacteria from food that has been poorly stored, handled or cooked. According to the Department of Health (DH) and Health Protection Agency (HPA) report Health Effects of Climate Change in the UK, and CCRA Health report there is a tendency for the number of cases of food poisoning to increase during warm weather as high temperatures favour the multiplication of some pathogenic micro-organisms in food, and with increased temperatures, there is a risk that food poisoning incidents will become more frequent. Existing evidence discussed by these reports and the Scottish Government Climate Change Adaptation Framework identified that a mean temperature increase of 1^{o}C would result in an increase of food borne illness of approximately 4.5% across the population with a higher risk of that due to *Salmonella* (about 12.5%).

49. *Campylobacter* and *E. coli* risks could also increase, for example as identified in the West Midlands as part of a research led by the West Midlands Regional Climate Change Partnership and undertaken in partnership with Defra, the West Midlands Public Health Observatory, HPA, DH West Midlands, UKCIP, University of Birmingham, and others. See Health Effects of Climate Change in the West Midlands Technical report.

50. JSP 456 DCM Volume 3 Food Safety Practices provides an amalgam of regulations, instructions, advice and point of reference for food safety management. However catering managers should consider whether critical control points may need to be adapted / strengthened during hotter weather. For example, the critical control point for contamination and growth of food poisoning bacteria or toxins in a refrigerator is a temperature <8^{o}C, but during hotter weather it may be more adequate to follow the best practice guidance which advises 5^{o}C as ideal operating temperature for a refrigerator. In countries with hotter summers like Spain the population is advised to lower the temperature of the fridge to 4-5^{o}C during the summer and ensure perishable foods are placed in the colder area of the fridge which is about 2^{o}C.

51. The time that perishable food is out of the fridge should also be limited during hotter weather.

Signposting documents

52. DIO Policy Instruction 15/08 *Occupational Diseases on the rural Defence Estate, with particular reference to Lyme disease* provides guidance how to minimise the risk of contracting occupational infections on the rural Defence Estate. However, establishments and line managers should take into account that the range and seasonality of ticks are likely to increase http://defenceestates.cis.r.mil.uk/library/library_index_policy_instructions.asp

53. The Chartered Institute of Environmental Health (CIEH) report, "The impact of climate change on pest population and public health" identifies key climate related changes on UK pest populations.

54. For further information on tick trends, hotspot areas and advice see the Health Protection Agency (HPD) and the NHS related pages.

55. The report European Centre for Diseases Prevention and Control Assessing the potential impacts of climate change on food- and waterborne diseases in Europe provides information on the

potential impacts of climate change on food and waterborne diseases in Europe including Campylobacter spp., Cryptosporidium spp., Listeria spp., Norovirus, Salmonella spp. and non-cholera Vibrio spp. and their links with different climate variables.

56. JSP 456 covers other MOD Catering policies including JSP 456 DCM Volume 1 (Nutritional advice and healthy eating); JSP 456 DCM Volume 2 (setting Catering Accounting Regulations) and JSP 456 DCM Volume 4 (providing Catering Accounting Regulations in the PAYD arena).

57. For tips against the spread of food borne diseases see the "Health effects of climate change in the West Midlands" Summary report.

WIND

58. There may be an increased risk of injury caused by strong wind. Issues regarding the safety of structures and trees will need to be monitored during high winds; this will be informed by the outcome of tree surveys and professional structural appraisals.

59. As for cold snaps, the level of uncertainty regarding wind projections is high, so establishments are recommended to monitor whether increasing frequency and intensity of wind speed will present a risk to the establishment.

Signposting documents

60. HPA related pages and report Chemical Hazards and Poisons Report Sep 08 contains guidance on windstorms for the public workforce (see pg 49-52).

61. CIEH document "Climate Change and its Health Implications" provides advice on how to adapt to various climatic risks including windstorms (see pg. 61-62).

62. Met office web pages on what to do during extreme weather includes advice for storms.