DEFENCE ESTATES
Delivering Estate Solutions to Defence Needs

Section 7:

Climate Impacts Risk Assessment Method (CIRAM)

CONTENTS

CLIMATE IMPACTS RISK ASSESSMENT METHOD (CIRAM)

TEXT **Page**

7.1	**Introduction**	**7-1**
	What is CIRAM?	7-1
	Why is CIRAM Important?	7-1
	When is CIRAM Required?	7-4
	Governance	7-4
7.2	**How to Undertake CIRAM**	**7-5**
	Introduction	7-5
	Who can help?	7-6
	Stage A – Pre-workshop Preparation and Production of Delegates Pack	7-7
	Stage B – Risk Assessment Workshop	7-18
	Stage C – Post-workshop Review	7-31
	Stage D – Implementation	7-32

BOXES

7.1	UK Climate Impacts Programme	7-2
7.2	Task A2 – Objectives and Critical Operational Functions for RAF Kinloss	7-9
7.3	UK Climate Projections (UKCP09)	7-13
7.4	Interpreting the Climate Projections	7-15
7.5	Identifying Critical Thresholds	7-25
7.6	MOD JSP 892 Risk Scoring Matrix	7-26
7.7	MOD JSP 892 Definitions of Risk Likelihood and Impact	7-27
7.8	Certainty of Climate Change Projections	7-28
7.10	Risk Adaptation Strategies	7-30
7.11	Risk Adaptation Processes	7-34

TABLES

7.1	Frequently Asked Questions	7-iii
7.2	Indicative resource requirements for undertaking a CIRAM assessment	7-6
7.3	Information required to compile and sources	7-10

FIGURES

7.1	The five steps in the MOD Risk Management Process	7-3
7.2	Key stages and outputs of the CIRAM assessment	7-5
7.3	Stage A Tasks	7-7
7.4	Stage B Tasks	7-19
7.5	Steps to identify climate-related risks	7-26
7.6	Example linking climate risk with existing MOD processes	7-29

HOW TO USE THIS GUIDANCE

This guidance forms Section 7 of the MOD Sustainability and Environmental Appraisal Tool Handbook ('the Handbook'). It provides guidance on undertaking a Climate Impacts Risk Assessment.

Chapter 7.1: Gives the background to CIRAM and its importance to MOD.

Chapter 7.2: Provides practical guidance on undertaking a CIRAM assessment.

FREQUENTLY ASKED QUESTIONS

A summary of where to find information in this guidance is provided below.

Table 1 Frequently Asked Questions

Frequently asked question	Relevant section of guidance
What is CIRAM?	Paragraph 7.1.1
Why is it important?	Paragraph 7.1.5
When does it apply?	Paragraph 7.1.11
Who is responsible for delivering a CIRAM assessment?	Paragraphs 7.1.13, 7.1.14 & 7.1.15
What resources will it require?	Table 7.1
What resources are available to deliver a CIRAM assessment?	Paragraphs 7.2.6 & 7.2.7

To improve this guidance, any feedback and good practice case studies are welcomed. Please provide any feedback, good practice or other suggestions to sustainable.development@de.mod.uk

7.1 INTRODUCTION

WHAT IS CLIMATE IMPACTS RISK ASSESSMENT METHODOLOGY (CIRAM)?

7.1.1 CIRAM is a tool designed to improve the resilience of MOD establishments to climate related hazards, ensuring the continuity of defence outputs. It has been developed to meet MOD's business and statutory commitments.

7.1.2 CIRAM identifies the risks posed by current and projected impacts of climate or extreme weather events on the outputs of MOD establishments and identifies actions required to maintain and optimise operational capability. It identifies:

- Existing vulnerabilities to weather related hazards;
- Whether existing vulnerabilities are likely to change over time;
- Any additional vulnerability likely to arise in future;
- The likely direct and indirect impacts on defence output;
- Actions and measures to build resilience into the defence function of the establishment and
- Any opportunities created by changes in climate.

WHY IS CIRAM IMPORTANT?

7.1.3 CIRAM will enhance MOD Business Resilience proportionate to the risks posed by weather and climate related hazards. It can enhance the performance of the MOD estate, by identifying improved efficiencies, better targeting of resources, adopting flexible solutions and managing social impacts.

7.1.4 The UK Climate Change Act (2008) requires government departments to undertake an assessment of their climate change risks on a quinquennial basis. Departmental Adaptation Plans (DAP) are one of the mechanisms to deliver this requirement. The MOD Climate Change Delivery Plan, published Mar 10, reinforces this commitment.

7.1.5 The mandatory Sustainable Development in Government (SDiG) targets also support the requirement of the Climate Change Act, and require MOD by 2015 to have increased its resilience to the impacts of climate change by completing a risk assessment and have developed, implemented, monitored and reviewed an action plan to improve its estate's preparedness to the impacts of climate change. Thereafter, a system of continuous review will be required on an annual basis. This requirement will apply to all buildings and land but will be based on a risk based approach to allow departments to take account of their individual circumstances.

7.1.6 CIRAM also compliments wider Government work on building the resilience of critical national infrastructure from a range of risks including climate (www.cabinetoffice.gov.uk/ukresilience/infrastructureresilience.aspx). MOD is required to ensure its critical sites are identified and are properly protected. The outputs of CIRAM will inform this process and will complement security threat assessments already undertaken.

Box 7.1 UK Climate Impacts Programme

The UK Climate Impacts Programme (UKCIP) is a government funded (Defra and others) organisation with the aim of providing a framework for an integrated assessment of climate change impacts.

UKCIP provides a range of tools, methods and guidance that can be used to help organisations identify how they might be affected by climate change and what they can do to minimise their risks or exploit the opportunities.

In June 2009 UKCIP released UKCP09, the most comprehensive package of climatic projections produced to date. For the first time it provides probabilistic projections of climate change based on quantification of the known sources of uncertainty to support users in exploring potential impacts, vulnerabilities and adaptation options. The UKCP09 projections can be found at www.ukcip.org.uk

7.1.7 The Intergovernmental Panel on Climate Change (IPCC) in its Fourth Assessment Report (2007) concluded that changes in global climate are inevitable for the next 50 years at least, regardless of any future reductions in greenhouse gas emissions. This is due to historical emissions and the inertia in the climate system. MOD will therefore, need to adapt to some climate change regardless of any future reduction of emissions. The key climate impacts identified by the UK Climate Impacts Programme (UKCIP) are likely to be:

- An increase in the risk of flooding and erosion, both coastal and fluvial;
- Greater pressure on drainage systems;
- Increased likelihood of storm damage;
- Increased risk of water shortages and low stream flows;
- Increased risk of subsidence and landslides ;
- Buildings becoming uncomfortably hot ;
- A range of health issues and
- Loss of many important habitats for wildlife.

7.1.8 Climate change is likely to exacerbate existing risks as well as create additional risks and opportunities for MOD establishments. There will be implications for the way the estate is managed and developed; core works, core services and refurbishments will need to reflect future climatic conditions; business continuity processes may need to be revised; new ways of working introduced and there may be issues for establishment security.

CIRAM

7.1.9 CIRAM is a risk assessment methodology based on MOD's own risk management methodology (forthcoming JSP 892 MOD *Risk Management Policy*) Fig 7.1. CIRAM has four stages focussed on a risk assessment workshop and the production of the Climate Resilience Risk Register. The stages are as follows:

a. **Stage A Pre-workshop Preparation**. This stage identifies the establishment's objectives and critical operational functions (which will determine the scope of the assessment) and the compilation and interpretation of the establishment's historic weather and projected climate change information. A production of a delegates' pack, containing this information is the main outcome and is provided to participants in advance of the risk workshop.

b. **Stage B Risk Workshop**. The workshop identifies the current and potential climate related risks to the operational output of the establishment. It also identifies risk management actions together with processes and their owners that would be required to maintain operational capability and make the establishment more resilient to the impacts of climate. A Climate Resilience Risk Register is produced.

c. **Stage C Post Workshop Review.** This involves reviewing and consulting on the Climate Resilience Risk Register with the relevant stakeholders, clarifying the risks, actions and ownership. The risk register is then agreed and adopted by the establishment.

d. **Stage D Implementation**. This involves the integration of the risk actions into the establishment's processes for delivery. The risk register is reviewed annually with a quinquennial full CIRAM assessment. Ongoing monitoring of risks and assurance of delivery.

Figure 7.1 The Five Steps of the MOD Risk Management Process

WHEN IS CIRAM REQUIRED?

7.1.10 CIRAM has been developed to allow MOD to meet its statutory and policy obligations. CIRAM can be applied to any MOD establishment within the UK and abroad. The current target is to complete CIRAM assessments on the most critical defence establishments (approximately 70 sites) by March 2013 and then any remaining priority operational establishments, identified by the TLBs by 2015. This requirement is reflected within the MOD Climate Change Strategy.

7.1.11 However, the CIRAM tool can be applied to and inform other estate initiatives such as:

- Plans, programmes or projects with implications for the MOD estate;
- The long-term development of an establishment e.g. Establishment Development Plan;
- Strategic initiatives e.g. Defence Estates Development Plan, equipment basing studies etc. and
- A Strategic Environmental Assessment.

GOVERNANCE

7.1.12 The TLB Climate Change Adaptation Focal Point (CCAFP) is responsible for ensuring the Heads of Establishment (HoEs) undertake a CIRAM assessment on their defence critical establishments by Mar 2013. They will report annually on CIRAM implementation to DE Property Directorate.

7.1.13 HoE (of sites required to undertake a CIRAM assessment) shall ensure any resulting management actions arising from the CIRAM assessment are reflected within their management procedures for delivery e.g. IEMP, security and BCP.

7.1.14 The HoE will ensure their Climate Resilience Risk Registers are reviewed on an annual basis and a full CIRAM assessment is carried out every five years. The HoE will report on progress and feed any issues which require a non-establishment response to the TLB CCAFP.

7.1.15 The monitoring of the CIRAM roll-out and Climate Change Adaptation is part of the Estate Sustainable Development Group's (ESDeG) remit, and will report progress to the Senior Estate Development Group (SEDG). A climate adaptation sub-group of the ESDeG will be established.

7.1.16 DE Property Directorate will provide guidance on the CIRAM process and report on progress. Sustainable Development Support (SDS) within DE Ops North Professional Technical Services will provide relevant climate and establishment data as well as support in facilitating CIRAM workshops, where resources allow.

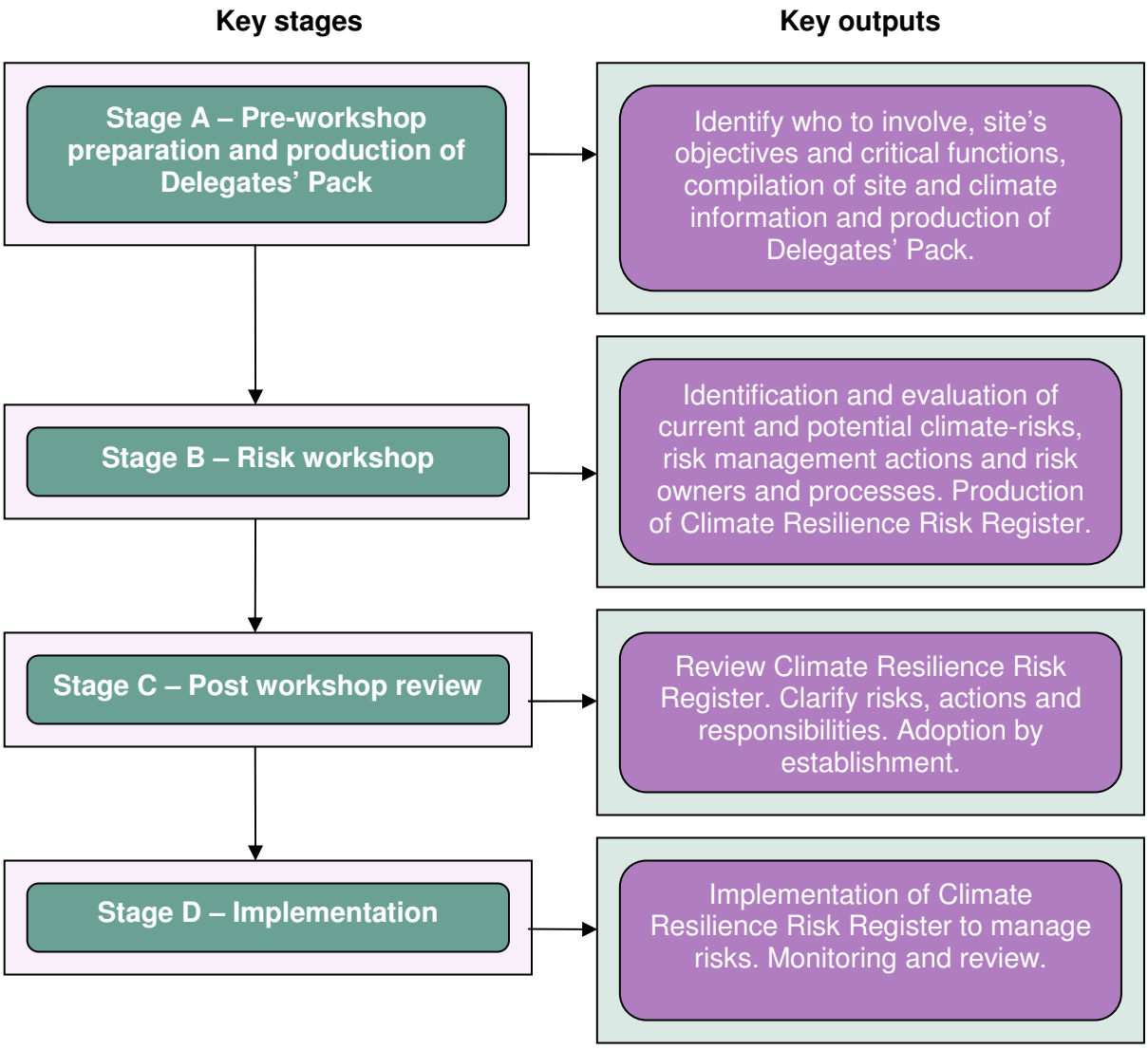
7.2 HOW TO UNDERTAKE A CLIMATE IMPACTS RISK ASSESSMENT

INTRODUCTION

7.2.1 This chapter provides practical guidance on how to prepare and undertake a CIRAM assessment and its implementation as well as identifying roles and responsibilities. The CIRAM assessment has 4 key stages (Fig. 7.2) which are:

Stage A – Pre-workshop Preparation and Production of the Delegates Pack
Stage B – Risk Workshop
Stage C – Post Workshop Review
Stage D – Implementation

Figure 7.2 Key stages and outputs of the CIRAM assessment



Resources

7.2.2 Stage A (pre-workshop preparation) is the most resource intense as it involves the collation and interpretation of climate and site data (approximately 3-4 days FTE). The Sustainable Development Support (SDS) team within DE Ops North PTS has been allocated resources to compile this information for defence critical sites as part of the initial roll-out phase of CIRAM. Prompt availability of existing information (e.g. Business Continuity plan) by TLBs and establishments will minimise delays. Climate information is collated on a 25km^2 scale and therefore may also be applicable to neighbouring establishments. For example climate data for Thorney Island can be applied to the Portsmouth/Gosport area.

7.2.3 The risk workshop will last for up to a day and should be attended by relevant internal and external staff, including military and contractors, who are responsible for the management of the establishment (para. 7.2.28).

7.2.4 It is advisable to allow up to four weeks for the post-workshop review and consultation of the Climate Resilience Risk Register before its formal adoption by the establishment. This provides an opportunity for the HoE and/or nominated representative and workshop participants to review and further understand the risks and actions identified in the workshop, but also to consult with any stakeholders identified as risk owners.

7.2.5 The annual review of the Climate Resilience Risk Register can be combined with existing processes e.g. review of establishment IEMP, SHEP committee meetings etc.

Table 7.2 Indicative resource requirements for undertaking a CIRAM assessment

CIRAM stage	TLB Staff Resource	DE Staff Resource
Pre-workshop preparation	• Support DE SDS in provision of information and critical objectives for site. • Organise workshop and attendees in conjunction with SDS.	• Collate and interpret climate data (up to 3-4 days). • Support Establishment in organisation of workshop.
Risk workshop (1 day)	• Facilities for workshop. • Attendance by relevant TLB and establishment staff including military (1 day).	• Workshop facilitated by DE SDS (1 day). • Attendance by relevant DE and contractor staff e.g. SETL, LMS etc.
Post workshop review	• HoE nominated representative to agree sign off of Climate Resilience Risk Register.	• DE SDS to provide support in agreement of risk register where required.

Who can help?

7.2.6 The SDS team are available to undertake Stage A of CIRAM for those establishments identified as being defence critical. SDS will also provide support in facilitating the workshops for these establishments. SDS resources will be limited for supporting CIRAM assessments for the remaining operational and less sensitive establishments. The guidance contained within this Section will enable non-specialists to undertake a CIRAM assessment.

7.2.7 The Climate Change Adaptation Focal Point within DE Property Directorate can provide policy advice on the CIRAM process especially involving novel or contentious issues.

STAGE A – PRE-WORKSHOP PREPARATION AND PRODUCTION OF DELEGATES' PACK

Introduction

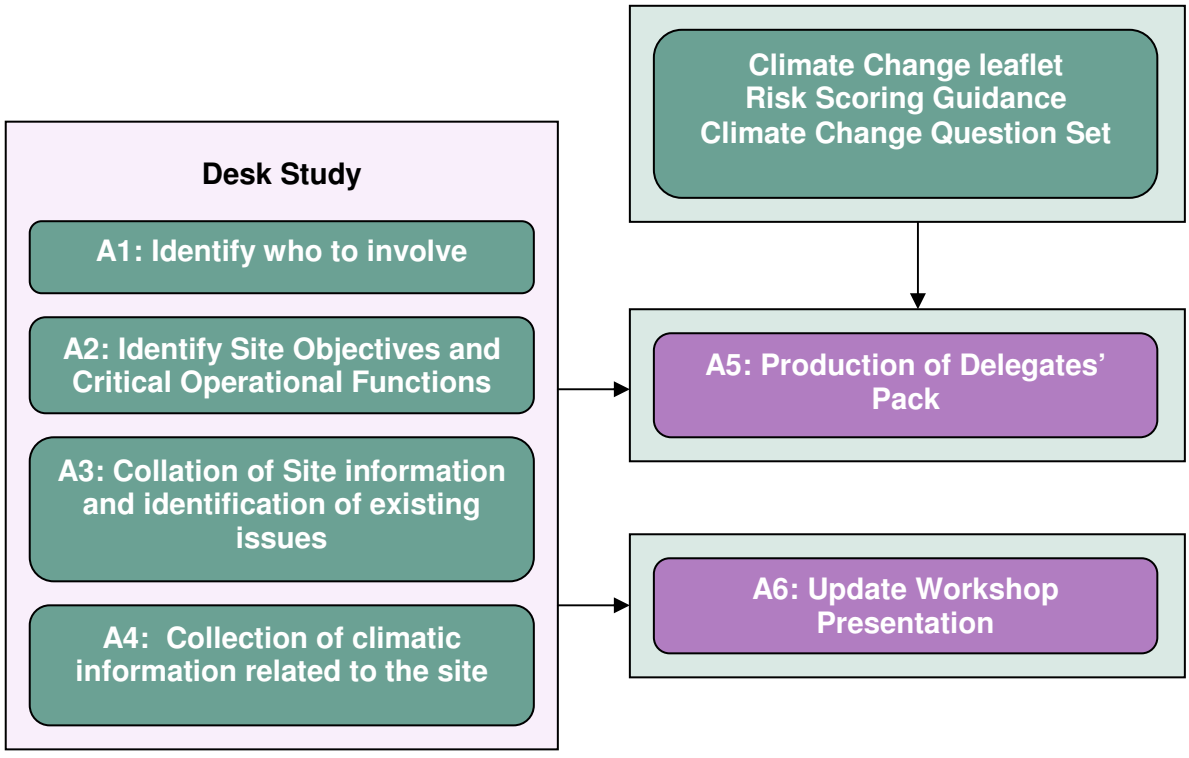
7.2.8 Stage A involves a desk study to collate the climate and site information, the production of a delegate's pack and accompanying workshop presentation. The aim of the delegates' pack is to provide participants at the workshop (Stage B) with the relevant information to allow them to effectively contribute and identify risks. The desk study requires compiling the following information:

a. Identifying the establishment's objectives and operational functions in delivering its defence output (this will govern the scope of the assessment);

b. Details of the infrastructure, assets and utilities on the establishment; and

c. Historic and projected climatic information for the establishment.

Figure 7.3: Stage A Tasks



A1: Identifying who to involve in the Desk Study

7.2.9 When undertaking a CIRAM desk study it is important to engage with a number of functional areas that can provide guidance, support and the key information required. These include:

a. **Sustainable Development Support (SDS)** within DE Ops North PTS. The SDS team can:

i. Provide advice on compiling the observed and projected climate data as well as establishment information. SDS is tasked with compiling this information for defence critical establishments.

ii. Facilitate the CIRAM workshop. SDS is tasked with initially facilitating the CIRAM workshops for defence critical sites. Resources may be available on a case by case basis to facilitate any remaining priority operational establishments.

b. **MOD Climate Change Adaptation Focal Point within DE Property Directorate**. The focal point can provide policy advice on the CIRAM process and provide expert guidance in the application of CIRAM on any novel or contentious issues (Annex 7N for contact details).

c. **Head of Establishment (HoE**). It is important to keep the HoE informed of progress. The HoE for defence critical sites is responsible for ensuring a CIRAM assessment is conducted on their establishment. The HoE has a duty to implement the Climate Resilience Risk Register and report on progress to their TLB Climate Change Adaptation Focal Point.

d. **Site Estate Team Leader (SETL), Estate Manager, or equivalent** should be engaged as they will provide information regarding the management of the establishment e.g. IEMP, IRMP etc. together with any other additional information e.g. age of built assets, recurrent issues e.g. exceeding drainage capacity etc. The SETL or equivalent should be provided an early opportunity to review the accuracy of the delegates' pack. Engagement with this role is important as it encourages the establishment's endorsement of CIRAM.

e. **Site Business Continuity (BC) Focal Point** can assist in identifying the establishment's objectives and critical operational functions and the extent of existing Business Continuity Plans.

f. **Site Safety, Health, Environment and Fire Officer or equivalent** can assist in identifying the establishment's wider sustainable development, environmental and health and safety obligations e.g. discharge consents.

g. **Staff with good site knowledge** and long experience of the establishment should also be consulted, as they are likely to have a detailed knowledge of the impacts of previous weather-related events.

A2: Identification of Objectives and Critical Operational Functions for the establishment

7.2.10 It is essential to identify the establishment's key objectives and critical operational functions that are fundamental to delivering operational capability on the establishment and if compromised would have a negative impact on operational output. This includes any dependant or sister sites.

7.2.11 Wider sustainable development and environmental issues should also be considered where there is a legal obligation or a significant reputational impact.

7.2.12 It will be necessary to consult with the site Business Continuity Plan to identify the critical assets and operations on site. If no Business Continuity plan is in place then the establishment should be consulted to agree the success criteria for the establishment. An opportunity is provided during the workshop to review the objectives and success criteria.

7.2.13 Assets or functions not key to delivering establishment operational capability should not to be included within the scope, e.g. sports clubs. An example of an establishment's objectives and success criteria is at Box 7.2.

Box 7.2 Task A2 – Identification of Objectives and Critical Operational Functions at RAF Kinloss

Critical operational functions identified within the Business Continuity plan, are:

- Operating Airfield infrastructure;
- Essential services / utilities (water supply, power, Nimrod MSS, Communications)
- Security of personnel;
- Provision of Support Services (food supply, messes);
- The base needs to be operational 24/7/365 and
- Provision Service Family Accommodation (SFA).

The wider SD/Environmental legislative and policy obligations that could impact on the station's reputation are:

- Ensure high standards of Environmental Protection and Health & Safety (Station aims to always achieve A rating under SHEP external audits);
- Minimal impact to the environmentally and ecologically sensitive surrounding area;
- Contamination avoidance – Spillage plan in place; High standards for the operation and management of the hazardous waste; Discharge consents for drainage and interceptors (reed bed system);
- Provide buildings with comfortable interior environment/temperatures;
- Awareness / Provision of Environmental Protection courses to the station personnel;
- Minimise disruption and nuisance to the local community and promote the base as a good neighbour and
- Maximise opportunities for partnership working and community engagement activities and the use of local suppliers.

A3: Compiling establishment specific information and identification of existing issues

7.2.14 Information should be collated about information regarding the establishment (and surrounding area) to identify the key assets and dependencies (e.g. transport routes) in delivering the establishment's operational output. This includes other sister, satellite or remote sites which support the primary establishment's operational output e.g. radar stations, firing ranges, water access points, Service Family Accommodation (SFA) etc. The information contained within table 7.2 should be collated for the establishment. A worked example of establishment information is at Appendix 7A.

Table 7.3 Information required to compile and sources

FACTOR	SOURCES OF INFORMATION
Establishment Location Provide a description and map of site location with respect to local area:	
Topography (e.g. meters above sea level)	• Geographic Online Data for Estates (GEODE mapping) http://geode.cis.r.mil.uk/GEODE/ • Land Quality Assessment (LQA) for the site (GEODE, LQA Phases layer)
Transport routes (type and any documented existing issues)	• GEODE mapping (for location of routes) • Local Authority (LA) information may include information on transport routes vulnerabilities
Landscape (proximity to urban development, estuaries, forested areas, heathland areas etc.)	• GEODE mapping • Web pages for the establishment (e.g. HIVE) • Landscape component of the Integrated Rural Management Plan (IRMP) available from SETL or DE Ops North PTS EAS Estate Planning Team
Local community issues	• IRMP • Local Authority (LA) information on population increases • LA information on climate change adaptation
Regional climate issues and adaptation plans	• Regional Development Agency information on climate change adaptation http://www.defra.gov.uk/environment/climate/action/regions/index.htm
Geological conditions (e.g. type of soil) and hazards	• Land Quality Assessment for the site • British Geological Survey (BGS) http://www.bgs.ac.uk/britainbeneath/guide.html
Proximity to coast and related coastal erosion issues (e.g. wave action, tides)	• GEODE mapping • Coastal component of the IRMP • BGS off-shore & coastal geological hazards http://www.bgs.ac.uk/britainbeneath/off_hazards.html • Shoreline Management Plan (SMP) for the area http://www.environment-agency.gov.uk/research/planning/105014.aspx
Flood risk to establishment and to access supply routes	• Environment Agency (EA) and Scottish Protection Agency (SEPA) flood maps (fluvial and coastal flooding, indicative of floodplains and coastal floodplains. N.B. Does not include flood defences and other sources of flooding:

	www.environment-agency.gov.uk/homeandleisure/floods/default.aspx www.sepa.org.uk/flooding/flood_map.aspx • Catchment Flood Management Plans provide flooding information for the area on fluvial, tidal, surface water and sewer flooding: England http://www.environment-agency.gov.uk/research/planning/64223.aspx Wales http://www.asiantaeth-yr-amgylchedd.cymru.gov.uk/research/planning/33586.aspx • For a detailed establishment specific set of data including all sources of flooding and climate change projections, a Flood Risk Assessment (FRA) for the site should be undertaken, if appropriate
Establishment Description	
Infrastructure Asset	• Integrated Estate Management Plan (IEMP) available from the SETL or the Estate Planning Tool (EPT) but access requires training http://defenceestates.cis.r.mil.uk/organisation/operations/de_ops/ept/org_dgopsepttrain.asp] • Estate Development Plan (EDP) available from SETL or DE Ops North PTS Planning & Construction Team if available • Defence Property Gazetteer (DPG) - run an establishment query http://geode.cis.r.mil.uk/GEODE/DPGMainPage.html
Identify age and construction materials of assets	• IEMP • DPG
Training areas	• GEODE • IEMP • IRMP
Environmental issues e.g. landscape, nature conservation designations, heritage assets, discharge consents, contaminated land issues, access & recreation, etc.	• GEODE • IEMP • IRMP • LQA • SHEP committee / SHEF officer advice
Operational issues	
Identify current and future operational issues of the site	• IEMP
Staff issues (demographics, commuting distances etc.)	• SETL • SHEF officer • Business Continuity

Identify existing utilities (water, electricity etc.), suppliers and issues	• IEMP • DPG tool (establishment query)
Conditions on any planning permissions	• IEMP • IRMP • Local Authority (LA) • Local Regional Development Agency
Any documented weather related issues e.g. overwhelming of drainage during periods of intense rainfall	• Site records on maintenance events related to weather information may be available from SETL and SHEF officer • SHEP committee minutes • Industry Partner's data on maintenance issues • Local Authority information on climate change risks • Regional Development Agency information on climate change risks
Historic weather data	
Obtain any summary historic weather data relevant to the site	• Site weather station • Closest Met Office station 1961-90 averages http://www.metoffice.gov.uk/climate/uk/averages/19611990/

A4: Compiling climatic information from UKCP09 related to the site

7.2.15 Information on observed and projected climate change needs to be collated in order to understand the current and future impact of weather on the establishment.

7.2.16 This information is freely available from the UK Climate Projections 09 (UKCP09) which provides data on observed changes and projections under different emissions scenarios on how the UK climate is likely to change up to the end of the century (see Box 7.3). A worked example of an establishment's projected climate change is at Appendix 7B.

7.2.17 To ensure consistency of the application of CIRAM across the MOD estate it is recommended the following factors are considered when compiling the projected climate scenarios for a CIRAM assessment:

a. **2050 timescale**. This is the projected changes averaged for the period 2040–2069 relative to the 1961–1990 baseline and the 1980-1999 baseline for sea level rise and storm surge. This complements the timescale within the Defence Estate Development Plan (DEDP). It should be noted that not all UKCP09 outputs are provided for all timescales e.g. data for the number of hot days (annually) is only available for the 2080s period. If a business benefit is identified then different timescales may be considered.

b. **Use the "Future" climate change projections.** This is the difference between the absolute values for future climate and the 1961–1990 baseline, e.g. mean winter temperature will be 2 degrees warmer. However, for some climatic variables e.g. maximum summer temperatures it may be more appropriate to also use "absolute" values.

Box 7.3 UK Climate Projections (UKCP09)

What are the UK Climate Projections (UKCP09)?

In June 2009, the UK Climate Impact programme (UKCIP) released the latest and most detailed probabilistic projections on climate in the UK for the coming decades – the UK Climate Projections 2009 (UKCP09).The projections allow sectors to assess the potential impacts of the projected future climate and explore adaptation options.

The projections consist of numerous freely available datasets at the UKCP09 User Interface. There are a number of prepared reports but the data can also be interrogated to meet the needs of the user.

To find out more see http://ukclimateprojections.defra.gov.uk/.

Types of climate information provided in UKCP09

- Observed climate data (historical information (from 20th Century) - temperature, precipitation, storminess, sea surface temperatures and sea level),
- Future climate projections to 2100- temperature, precipitation, air pressure, cloud cover, radiation and humidity,
- Future marine and coastal projections to 2100 - sea level rise, storm surge, sea surface and sub-surface temperature.

Range of information provided by UKCP09

Using UKCP09, users can tailor queries to:

- Look at national, regional or local level (25km^2 scale),
- Look at future climate trends by decade,
- Present data graphically e.g. graph or map,
- Look at the measures of uncertainty in the future climate projections,
- Choose one of three different emissions scenarios - high, medium and low greenhouse gas scenarios..

UKCP09 has free on-line training http://moodle.ukcip.org.uk. Once registered, users can undertake courses on both projections and adaptation to climate change.

c. **Emissions scenarios**. It is recommended that the 10th and 90th percentiles for both the low and high scenarios are compared (Box 7.4), for the following reasons:

   i. It is not currently possible to predict future trends in greenhouse gas emissions. UKCP09 provides a number of different emission scenarios (low, medium and high) taking into account trends in energy demand, greenhouse gas emissions, land use change and the behaviour of the climate system etc. However, current research suggests the high emissions scenario is being followed.

   ii. IPCC and UKCP09 advise that using a single emission scenario will impact on the quality and robustness of the assessments undertaken and subsequent conclusions that can be reached.

   iii. Develop sensible contingency options for the future. The 10th and the 90th probability will give the range of the change likely to occur, so decisions can be made whether there is a need to adapt a particular asset to the low, medium or high projections depending on the type of asset and capability to undertake the risk.

d. It may be justifiable to only use the high emissions scenario due to the criticality of the establishment. However, this should be agreed with the establishment during Stage A as part of the identification of the objectives and critical operational functions. This also applies to the use of the High ++ sea level rise scenarios.

e. **Cumulative Distribution Functions (CDFs)** (Fig. 7.4) are graphs that plot probability against climate change variable e.g. temperature, precipitation etc. and can be produced on a 25km^2 grid scale.

Box 7.4 Interpreting the Climate Projections

The UKCP09 projections are probabilistic. Climate variables are presented for a range of probability levels. The **10th, 50th & 90th Percentiles** relate to the 10%, 50% and 90% probability change ranges, which mean the following:

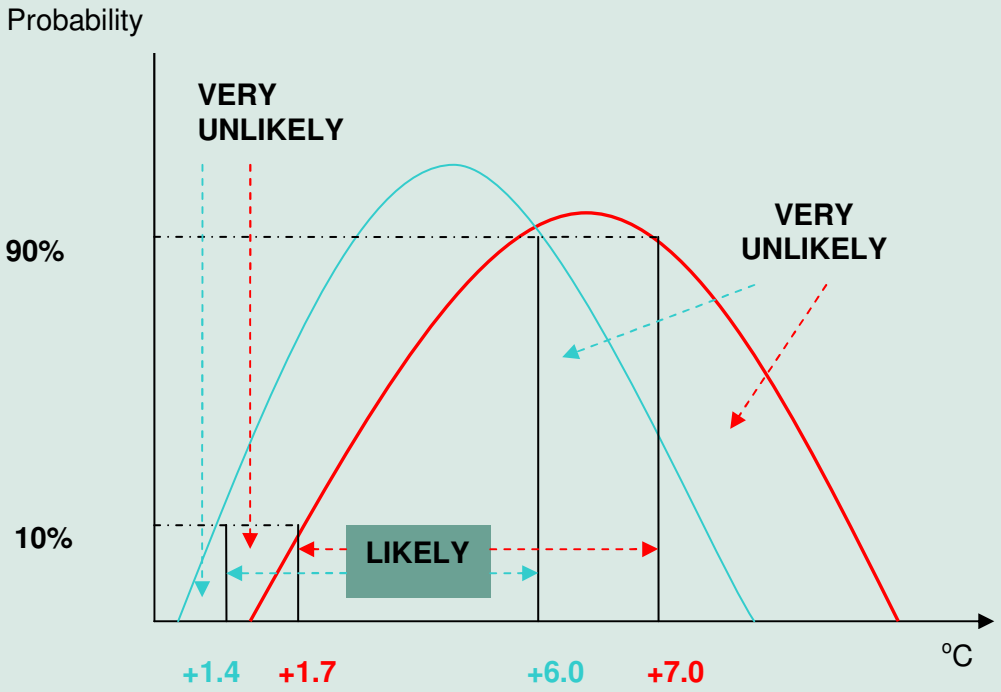
i. 10% = it is very likely that the change will be greater than

ii. 50%= central estimate, i.e. it is as likely as not

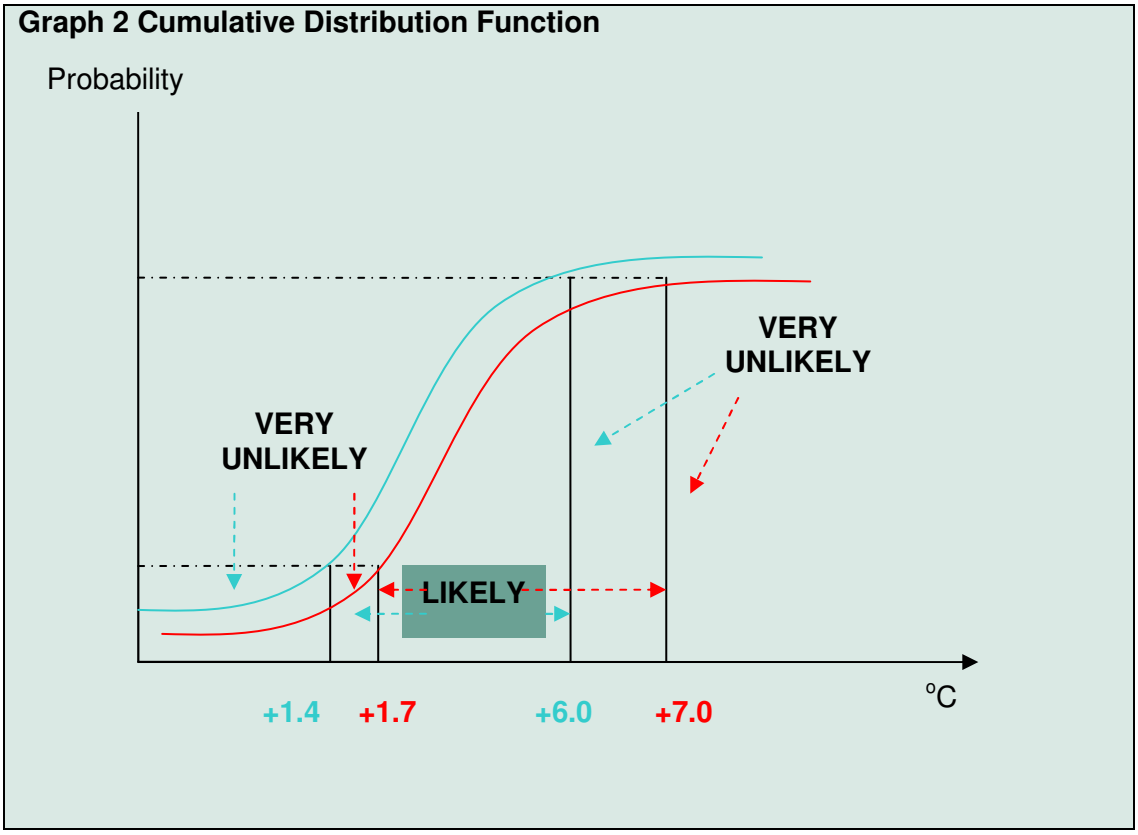
iii. 90%= it is very unlikely that the change will be greater than.

The graphs below illustrate the 10th and 90th percentiles and show the ways of presenting probability (Probability Density Function and Cumulative Distribution Function) for two emissions scenarios. The graphs illustrate that it is LIKELY that temperature change will be greater than +1.4°C under the medium emissions scenario (blue line) and +1.7°C under the high emissions scenario (red line), and VERY UNLIKELY that it will be greater than +6.0°C under the medium emissions scenario (blue line) and greater than +7.0°C under the high emissions scenario (red line).

Graph 1 Probability Density Function



Graph 2 Cumulative Distribution Function



7.2.18 The following projected climatic change variables should be considered within **all** CIRAM assessments:

- Mean summer temperature;
- Number of hot days (annually);
- Number of dry spells longer than 10 days (annually);
- Maximum daily summer temperatures;
- Mean winter temperature;
- Average temperature of the coolest day in winter;
- Mean summer precipitation;
- Mean winter precipitation; and
- Precipitation on the wettest day in winter.

7.2.19 Depending on the location of your site, other climatic variables may need to be considered within the CIRAM assessment. These include:

- Projected change in snow cover e.g. high altitude, latitude sites;
- Projected change in cloud cover;
- Projected change in relative sea level rise e.g. coastal sites;
- Projected change in sea temperature e.g. coastal sites; and
- Projected change in storm surge height e.g. coastal sites.

A5: Compiling the Delegates' Pack

7.2.20 The Delegates' Pack is designed to provide the workshop participants with an awareness of climate change issues, the CIRAM process, establishment-related issues and key projected climate change issues prior to attending the workshop. Participants are expected to review the information beforehand to enable them to effectively contribute.

7.2.21 The Delegates' Pack should include:

a. **Introduction**. This provides an overview of CIRAM process, the importance of undertaking the assessment and instructions for workshop participants. A suggested template for the introduction is at Appendix 7C. The Introduction should also include a link to:

- **Climate Change Leaflet**. This provides background information on climate change and the UKCP09 projections. The leaflet is at Appendix 7D.
- **Risk Scoring Guidelines**. This is guidance on how risks are scored and allows participants to familiarise themselves with risk scoring, if necessary. This guidance is at Appendix 7E.

b. **Agenda for Workshop.** A template is at Appendix 7F.

c. **Summary of Establishment Information**. This is a summary of the information collated during the desk study relevant to the site. It should identify the site objectives and critical operational functions. A worked example is at Appendix 7A.

d. **Summary of Climatic Information.** This is a summary of the key observed and projected climatic issues relevant to the establishment. It is important not to 'overload' participants with climatic information (graphs, maps etc.). Detailed maps and graphs should be included within the workshop presentation. A worked example is at Appendix 7B.

e. **Climate Question Set**. This is a list of questions that may arise during the workshop itself. It is designed to help the participants understand and formulate their views on the key climate-related risks to the establishment and any adaptation actions required. The Climate Question Set is at Appendix 7G.

7.2.22 The delegates' pack should be sent out in sufficient time to allow participants to complete their pre-workshop preparation. Participants should read through the material and consider the potential climate risks in advance of the workshop. Participants may have other relevant data or information and should be encouraged to highlight it at the workshop.

A6: Producing the Workshop Presentation

7.2.23 It is recommended that the PowerPoint template and speakers notes (Appendix H) are used. It will be necessary to populate the presentation with information relevant to the establishment i.e. objectives and critical operational functions, climatic information etc.. The workshop provides an opportunity to expand on the detail of the climate change projections through the use of graphs and maps.

7.2.24 A staff member (with detailed knowledge of the estate management of the establishment) should provide a short presentation providing overview of the site and covering any site issues outlined within the Delegates' Pack. Any additional information relevant to the process should also be raised.

STAGE B – RISK ASSESSMENT WORKSHOP

Introduction

7.2.25 Stage B concerns the organising and delivering the risk assessment workshop. The output of the workshop is a completed Climate Resilience Risk Register. Fig. 7.4 identifies the Stage B tasks.

7.2.26 There are two aims of the Risk Workshop. These are:

a. To identify current and future risks to the operational capability of the site as a result of climate related hazards.

b. To identify adaptation actions that would allow the site to become resilient to the effects of climatic events and therefore maintain operational capability, as well as identifying processes and risk action owners for delivery of these actions.

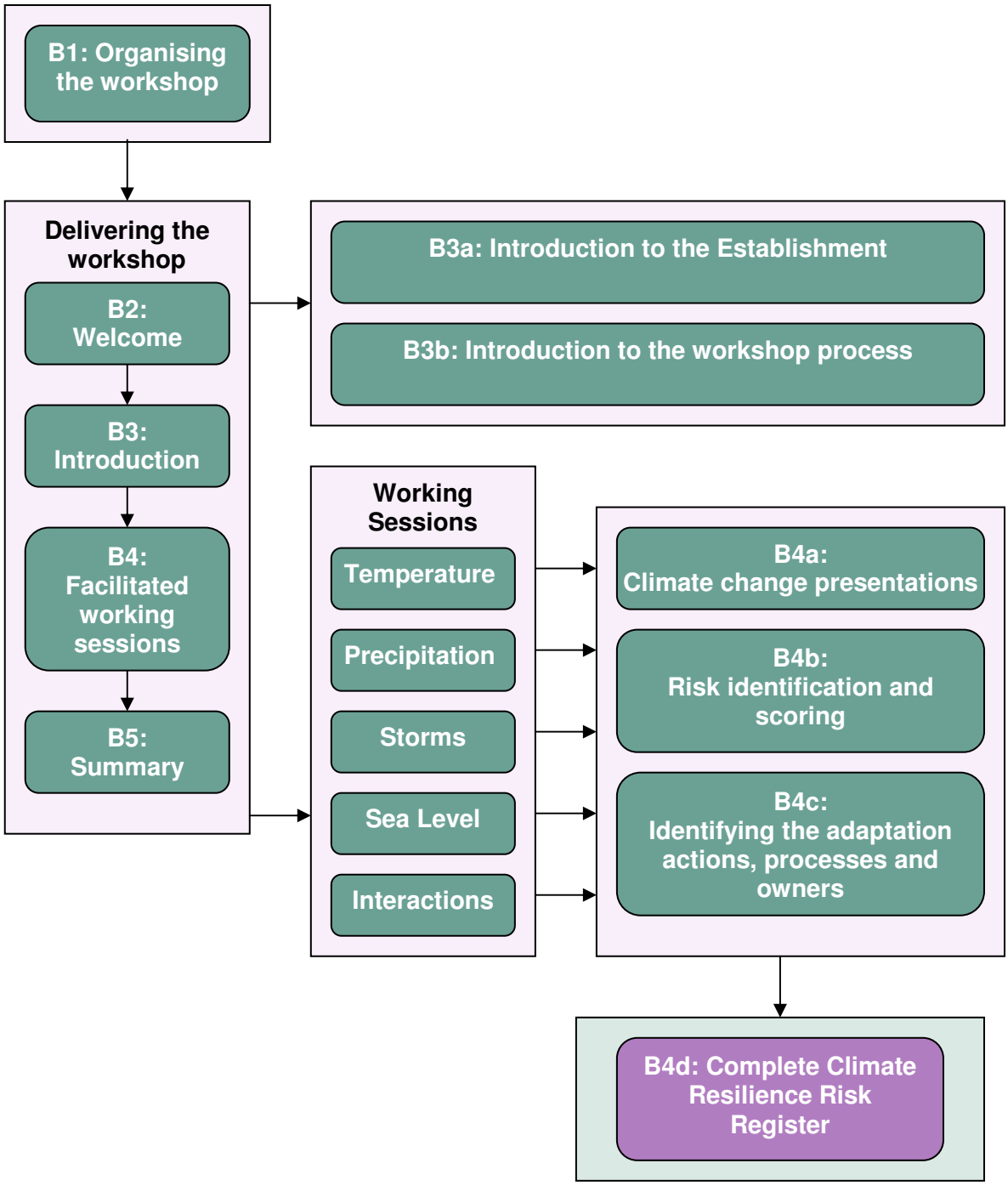
7.2.27 The workshop involves a presentation on issues relevant to the site (climate and site information) followed by a discussion to identify the risks which are then recorded on the Climate Resilience Risk Register. Adaptation actions are then identified and assigned a process and owner who are responsible for their delivery.

B1: ORGANISING THE RISK WORKSHOP

7.2.28 **Participants**. It is important to invite participants who are responsible for the management of the relevant functional areas on the establishment. The following functions should be represented:

- Representative familiar with military operations on site;
- Business continuity planning;
- Property/facility management;
- Land Management Services;
- Site Health & Safety and Fire management;
- Housing manager;
- Site Environmental management;
- Utility management (energy and water - supply and use);
- Contract management team (e.g. RPC and Aquatrine);
- Sustainable development advisory team;
- Emergency planning; and
- A site user.

Figure 7.4: Stage B Tasks



7.2.29 It is important to invite participants with long experience of working on the site who have knowledge of historical management issues and can provide an insight into the impacts of past extreme weather events have had on the establishment.

7.2.30 Different sites will have different contract arrangements in place and responsibilities may come under different organisational roles. All relevant functional roles should be consulted and represented at the workshop.

7.2.31 **Structure of the Workshop.** Up to one day should be allocated for the workshop. The template agenda (Appendix 7F) gives an indication of timings. The structure for the workshop should be as follows:

a. Welcome. Welcome participants and provide policy background to climate change adaptation and the relevance to defence, the CIRAM process and outcomes from the workshop.

b. Introduction to the Site. A brief presentation giving an overview of the site, identifying key operational functions, details of key assets and their condition.

c. Introduction to the CIRAM Process. A brief presentation on climate change science and observed trends, agreeing key objectives for the site (and therefore the scope of the assessment), identifying vulnerabilities and risk scoring. Outline the approach to the working sessions.

d. Climatic Variable Working Sessions. A detailed presentation on each climatic variable, (temperature, precipitation, storminess and sea level rise[1] and interactions) including observed and projected information relevant to the site. Each presentation is followed by a facilitated session to identify the risks, adaptation actions, processes and risk action owners and recording of these on the risk register.

e. Summary. Provides an opportunity review the proceedings of the day and agree next steps.

7.2.32 **Roles and Responsibilities.** There are a number of roles and responsibilities for those engaged in the workshop. These are as follows:

a. **Facilitator.** The role of the facilitator is to:

- Provide the introduction to the workshop;
- Deliver presentations on introduction to CIRAM Process and each climate variable; and
- Facilitate working sessions for each climatic variable.

As it is an intensive process, it may be advisable to have more than one facilitator (resources allowing). The Facilitator should identify current and potential risks with those responsible for compiling the site and climate data prior the workshop. Speaker notes are provided with the PowerPoint presentation (Appendix 7H) and a FAQ for climate sceptics and a Facilitators' Aide Memoire are provided (Appendices 7I and 7J).

b. **Risk Recorder.** A member of the establishment staff should be available to record the risks in the Climate Resilience Risk Register as they arise during the discussions and to record actions and process owners.

[1] Where applicable to the site

c. **The HoE or their representative** will be responsible for providing the presentation on the introduction to the site, including the establishment operations, infrastructure, training areas, covering the issues contained within the Delegates' Pack.

DELIVERING THE WORKSHOP

TASK B2: WELCOME

7.2.33 **Welcome.** A 10 minute 'welcome and introduction' to the workshop is recommended and should cover the following areas. A draft introduction is at Appendix 7K:

- Welcome;
- Importance of climate change to defence;
- Policy background on climate change targets and MOD Climate Change Strategy;
- Introduction to CIRAM; and
- Taking forward adaptation actions.

TASK B3: DELIVERING THE INTRODUCTIONS TO THE ESTABLISHMENT AND THE WORKSHOP PROCESS

7.2.34 **Introduction to the Establishment (B3a).** An introduction to the site is recommended. Visual aids can enhance the presentation e.g. maps, aerial photographs etc. Information within the delegates' pack may not cover all key issues; therefore an opportunity should be given for participants to contribute their own experiences.

7.2.35 **Introduction to the Workshop process (B3b).** This outlines the structure of the workshop and the completion of the risk register. The following should be covered:

a. Background to climate change science and projections, illustrating how climate change could impact the site. This provides an opportunity to explain the climate change projections and to justify the emissions scenarios and timescales used.

b. Identifying the key objectives and critical operational functions for the establishment. This provides an opportunity to review the key objectives and critical operational functions contained in the delegates' pack. This will set the scope of later discussions.

c. Guidance on the working sessions. Which will include:

- Identifying direct and indirect impacts and identifying critical thresholds;
- Scoring the risks;
- Identifying adaptation actions;
- Assigning a process and owner; and
- Recording on the risk register.

TASK B4: FACILITATING THE WORKING SESSIONS AND COMPLETING THE RISK REGISTER

7.2.36 **The format for each of the working sessions should be as follows:**

- Review existing and future climatic conditions (B4a);
- Identify the risks to the operational performance of the site (B4b);
- Score each risks (B4b) and
- Identify management actions, processes and owners against each risk identified (B4c).

B4a Review of existing and future climatic conditions

7.2.37 There should be four or five working sessions based on a single climatic variable depending on the establishment's location. The working sessions are:

b. **Temperature**. This session should be allocated the longest time slot as it is likely that participants will be able to identify risk related to temperature rise in most establishments. Also, this allows participants to become familiar with the process;

c. **Precipitation.** This session is likely to be long due to the variety of impacts and changes in seasonal precipitation across the UK;

d. **Storms frequency and intensity.** This session will also cover storm surge issues for coastal establishments;

e. **Sea level rise**. This session is relevant to coastal establishments or establishments reliant on the sea for operations or where transport and supply routes could be affected by coastal flooding and

f. **Interactions between variables and risks**.

7.2.38 **Interaction between variables and risks**. This final working session provides an opportunity to:

- Review the entries for temperature, precipitation, storminess and sea level rise;
- Identify whether any climate projections have cumulative or beneficial impacts;
- Identify any interactions between the proposed adaptation actions. There may be 'quick wins', cumulative or compounding effects;
- Identify any knock-on/chain effects on other areas if adaptation actions were implemented and
- Identify any wider, strategic or institutional risks e.g. budgetary constraints.

7.2.39 An aide memoire is available for facilitators to guide discussions (Appendix 7I). It should be noted that the aide memoire is not exhaustive.

B4b: Risk identification and scoring

7.2.40 The following information should be recorded on the Climate Resilience Risk Register (A template risk register and a worked example are at Appendices L and M):

a. Climate related risks. Identifying the direct and indirect impacts of current and future climate on the operational functionality of the site, together with any benefits and opportunities that may arise;

b. Prioritising and scoring current and future climatic risks

a. Identify any existing management actions currently in place which address the risks;

b. Identify future actions required to ensure resilience and deliver adaptation; and

c. Identify the risk owners and processes of the actions.

Guidance to Risk Identification

7.2.41 The identification of risks involves the identification of direct and indirect impacts and an assessment of the "critical thresholds" of those risks to operational capability. This process involves:

a. The identification of existing climate risks, by considering how climate has historically impacted the establishment. This will enable an assessment of how climate may impact on the establishment in future.

b. It is important to assess whether past weather events have caused **critical thresholds or sensitivities** to be breached and therefore impacting on the operational output of the establishment. A critical threshold is the boundary between **'tolerable' and 'intolerable' levels of risk** e.g. the amount of precipitation required to cause a flood that disrupts operations (Box 7.5).

c. Climate risks or thresholds may already be reflected within existing risk management processes. However, climate change is likely to alter the current thresholds and this will be a gradual process over time.

d. Quantitative values for critical thresholds should, where possible be recorded on the risk register e.g. IT performance sub-optimal at ambient temperatures above 32ºC. If this information is not available, then further exploration and monitoring may be required to identify the thresholds.

e. Once current climate risks have been identified they should be considered in the context of the climate projections to determine whether they are likely to be exacerbated and whether the critical thresholds are more likely to be exceeded in future.

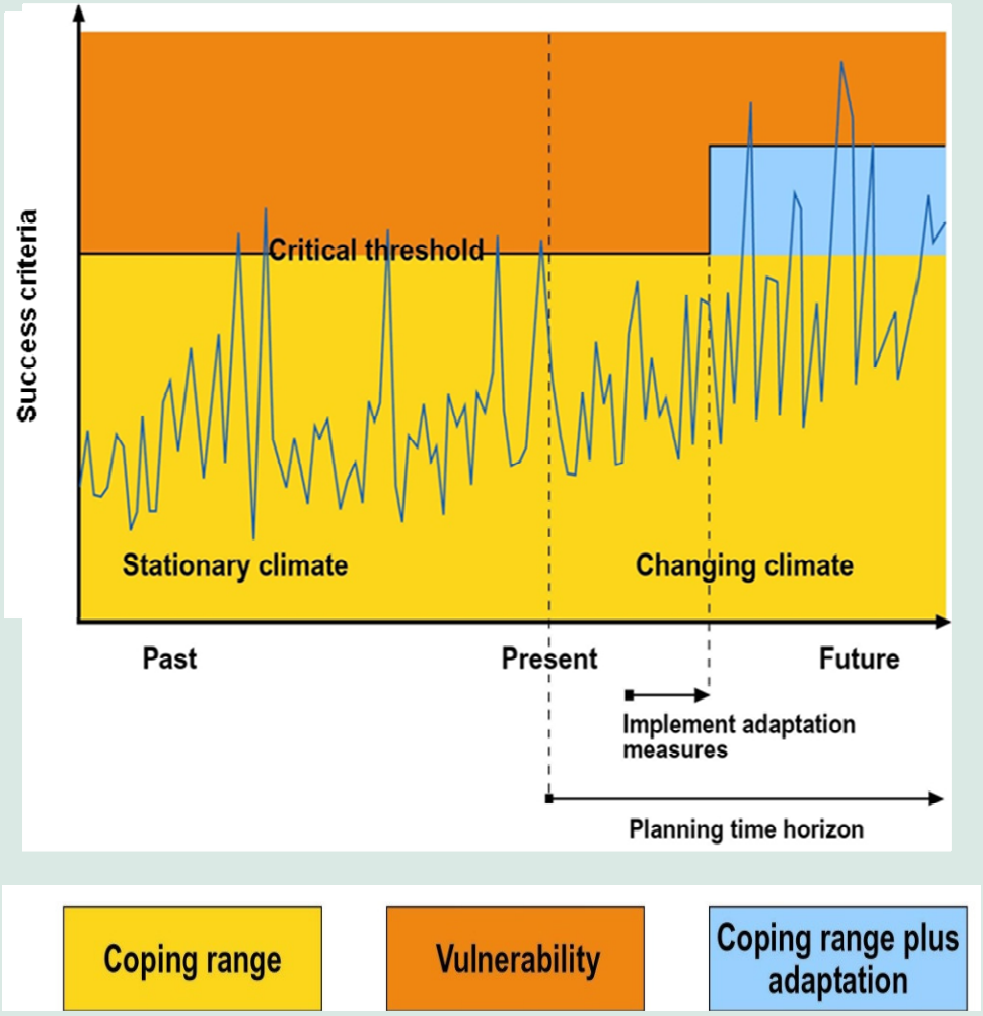
Box 7.5 Indentifying Critical Thresholds

An example of a critical threshold is the height of a flood defence. When water levels reach a certain threshold height, the establishment floods.

The height of the water when it floods is the "critical threshold" as illustrated on the graph below. If climate change is considered e.g. sea level rise or the height of the river (jagged blue line on the graph), there is a gradual upward trend.

The critical threshold will therefore be reached with greater frequency in the future e.g. due to increased sea rise or winter river flows.

To cope with this change, there is a requirement to **adapt**. In this example, the adaptation measure would be to increase the height of the flood defence. This is represented on the graph by the step in the horizontal and the blue shaded area. By adapting, the 'coping range' has been increased.



Guidance to Risk Scoring

7.2.42 Once a risk has been identified, its significance should be assessed by using scoring methodology contained within the MOD risk assessment model (JSP 892). Both current and future risks should be scored. When scoring the risks the following factors should be considered:

a. Existing climatic/weather vulnerabilities;

b. Projected climatic change;

c. Existing management action, processes on site; and

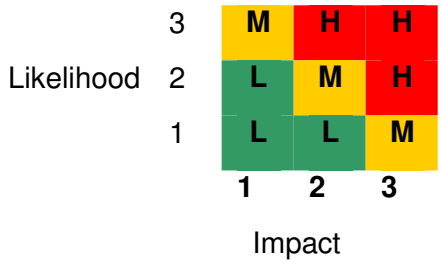
d. Any future management actions, processes etc. planned.

7.2.43 The assessment of the significance involves scoring the likelihood of a risk occurring and the magnitude that the impact will have on operations. This is scored using a 3x3 matrix to give a High, Medium or Low value to the risk (Fig. 7.5). The JSP 892 definitions for Likelihood and Impact are at Box 7.6.

7.2.44 The likelihood of current weather events will need to be established. Risks should be given a high rating if they are already a concern. It is important to consider whether critical thresholds are already being compromised.

7.2.45 It is important to note some changes in climatic variables e.g. temperature have a greater level of certainty than others e.g. storms (Box 7.8). It is important to reflect these differing certainty levels within the risk scoring.

Figure 7.5 MOD JSP 892 risk scoring



7.2.46 Some risks may have considerable uncertainty regarding their likelihood of occurring e.g. a protected species to migrate into/from from an establishment could impact on training especially if MOD activities exacerbate the issue (e.g. use of pyrotechnics during dry conditions). Workshop participants should use their judgment to estimate likelihood, by considering all the different vulnerabilities. Stakeholder attitudes should be considered as these may also impact on operational outputs e.g. conservation bodies may re-designate protected areas in response to a changing climate.

Box 7.6 MOD JSP 892 Definition of Risk Likelihood and Impact

LIKELIHOOD

High: Probable. 60% probability that the risk will occur. More likely to happen than not. Risk could occur within next calendar year

Medium: Possible. 30-60% probability that the risk will occur. About as likely to happen as not. Risk could occur within next two-four years

Low: Remote. <30% probability that the risk will occur. More likely not to happen than to happen. Risk could occur within next four-ten years

IMPACT

High: Major. Major impact on the achievement of Defence objective(s). Important reduction in performance. Major damage to reputation with extensive negative press coverage. Major management effort required.

Medium: Significant. Significant impact on the achievement of Defence objective(s). Moderate reduction in performance. Significant damage to reputation with significant negative press coverage. Significant management effort required

Low: Minor. Minor impact on the overall achievement of Defence objective(s). Some effect on performance. Minor damage to reputation with limited external press coverage. Moderate management effort required.

B4c: Identifying the resilience and adaptation actions, processes and owners

7.2.47 Having evaluated and scored the key risks, adaptation actions need to be identified and the process and risk action owner need to be assigned.

7.2.48 It should be noted that infrastructure was constructed on the basis of historic climate information and may not necessarily be adapted to changing climatic conditions and increases in frequency of extreme climatic events.

7.2.49 Risk controls and processes currently in place (e.g. management plans or existing maintenance regimes) should be assessed for fitness of purpose in a changing climate. If not, actions need to be identified to manage this risk. Any existing management actions in place that reduces the risk should be noted in the risk register. An example of how a risk is linked to existing MOD management processes is at Fig. 7.6.

Box 7.7 Certainty of Climate Change Projections

The IPCC acknowledges different climate change variables i.e. Temperature, precipitation etc. have differing levels of certainty.

Temperatures and sea levels are projected to continue to rise during the 21st century with high certainty i.e. there is an 80% chance or greater that the climate change projections are correct.

Future changes in precipitation (rain, snow, sleet, hail) are projected with 'medium certainty' i.e. 50% to 80% chance of projections being correct.

And changes in wind storms and storm surges are only projected with low certainty i.e. 20% to 50% chance of being correct.

Climate variables should be treated differently and establishments should ***plan and design for*** those variables projected with high certainty (rising temperatures and sea levels).

For those variables where there is lower certainty, such as increasing storm intensity, we should ***test the sensitivity and robustness*** of our assets and activities against the projected change.

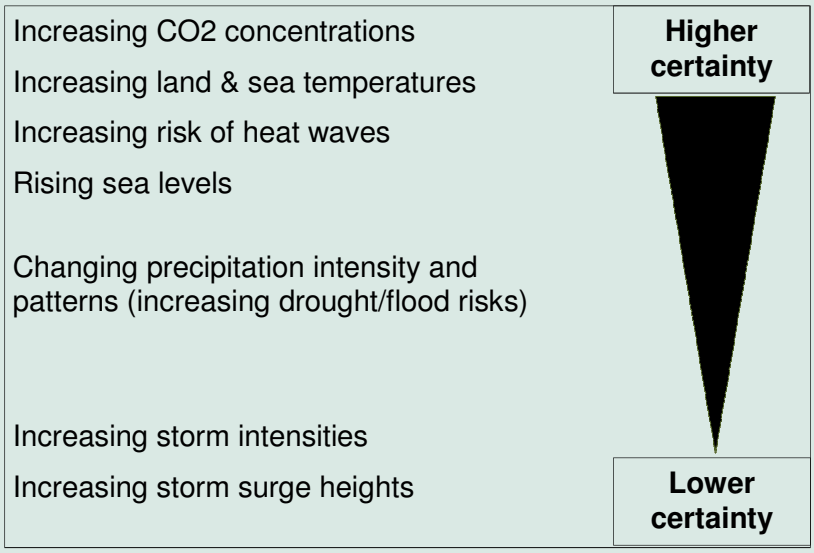
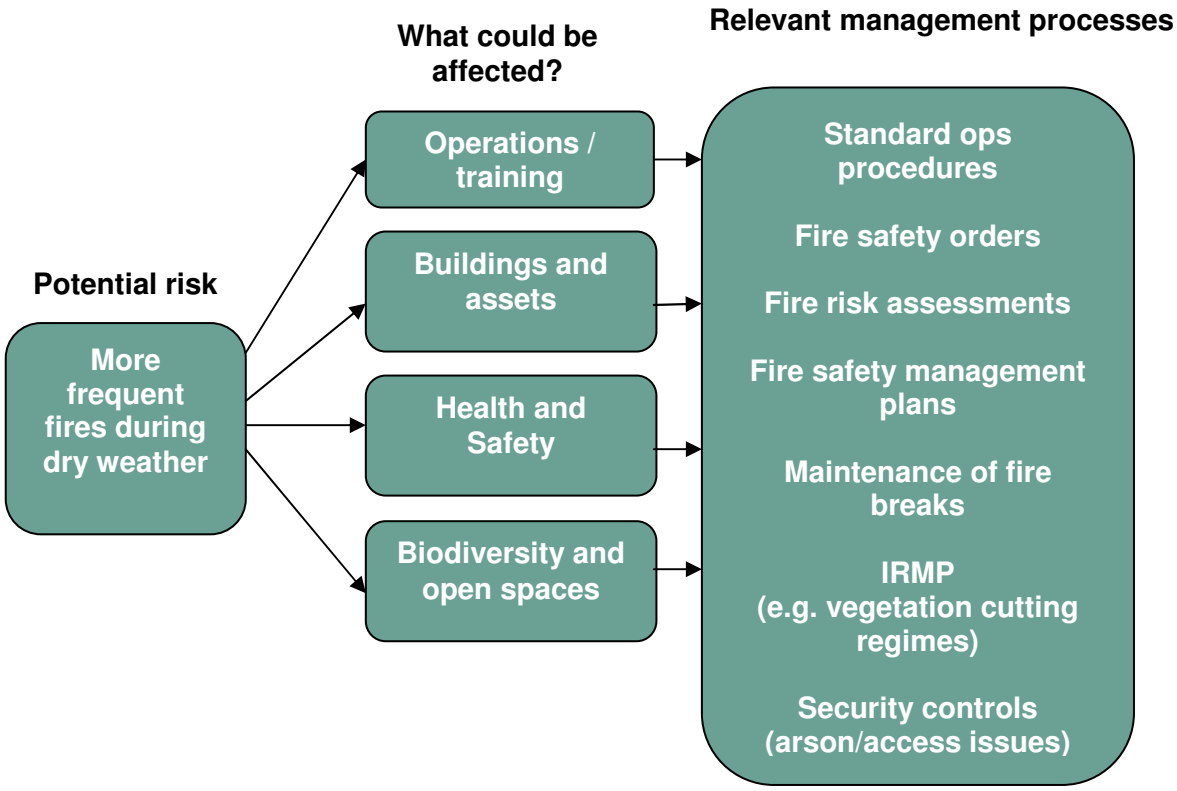


Figure 7.6 Example linking climate risk with existing MOD processes



7.2.50 Different risks will require different management strategies. The impacts of climate change may not be fully understood at this stage. In these cases the adaptation action could include monitoring of the effects of climate on performance of the asset. The information gained can better inform the decision making at a later date as part of the future review of the risk register . There may be opportunities to enhance the resilience of infrastructure to climate as part of routine refurbishment or facility upgrades. These two approaches are referred to by UKCIP as Building Adaptive Capacity and Delivering Adaptation Actions. Box 7.9 illustrates different risk management strategies (4Ts) as identified in JSP 892 and provides examples of adaptation action.

Box 7.9 Risk Adaptation Strategies

Risk Strategy	Definition on JSP 892	Adaptation examples
Terminate	Some risks will only be treatable to acceptable levels by terminating the activity	Accepting the loss of coastal site due to high risk of coastal erosion and flooding. Achieved through strategic estate planning
Transfer	Transfer the responsibility / burden of risk to another organisation that is more capable of managing the risk	Ensuring estate contracts (Regional or Stand Alone PC, PPPs, PFIs) incorporate climate change adaptation. Partnership working with Local Authorities, transport and utility providers e.g. Abbey Wood joint venture with the LA to resolve flood issues improving vehicular access to the site.
Treat	Continue with the activity whilst constraining the risk to an acceptable level. This option can be further broken down into four different types of controls:	
	Preventive control: limiting the possibility of undesirable outcome being realised	Increasing the resilience of new and existing infrastructure through adapting new builds and refurbishments. Improving maintenance regimes (proactive rather that reactive) e.g. monitor and clear drainage systems more frequently in order to minimise the risk of flooding Limiting certain activities during extreme circumstances e.g. use of water resources to wash vehicles during a drought; limiting public access to training areas during hot and dry weather.
	Corrective control: correcting undesirable outcomes which have been realised	Business Continuity Plans etc. that reflect climate risks will enhance the establishment's ability to recover from disruption from extreme weather events e.g. disruption of the energy supply.
	Detective control: identifying occasions of undesirable outcomes having been realised	Annual review of CIRAM risk registers. Monitoring of risks to determine their significance and critical thresholds, e.g. monitoring the high temperatures and low precipitation levels that will cause discharge consents to be breached. Auditing of projects for compliance with SA and DREAM on climate change adaptation.

	Directive control: ensuring that a particular outcome is achieved	Include adaptation measures within renewed contracts. Include adaptation measures within H&S risk assessments e.g. ensure long trousers are worn on training areas during warm weather to minimise the risk of tick-borne diseases, use hats and use of sun-cream protection to minimise the risk of heatstroke.
Tolerate	The risk might be tolerable without any control action required, the ability to address the risk may be limited or the cost of taking action is disproportionate to the cost of the risk	Weather related impacts that are a nuisance rather than disrupting operational outputs; Unaffordable actions; i.e. accepts the level of risk to output due to limited funding

STAGE C – POST WORKSHOP REVIEW

7.2.51 Following the workshop it is necessary to review the Climate Resilience Risk Register completed during the workshop. This provides an opportunity to:

a. Review, explore further and clarify the risks (and their scores) identified in the workshop;

b. Identify any new risks;

c. Review and clarify any adaptation action identified;

d. Clarify process and risk action owners; and

e. Obtain any further information that may inform the risks or adaptation.

7.2.52 The key stakeholders should be engaged in the review. Any subsequent stakeholders identified within the risk workshop should also be engaged.

7.2.53 Once the risk register has been agreed with key stakeholders, it should be formally adopted by the establishment. Copies of the risk register should be lodged with the TLB Climate Change Adaptation Focal Point (CCAFP) and within the relevant management risk owners (e.g. H&S, IRMP, Business Continuity etc.).

STAGE D – IMPLEMENTATION

Incorporate into action plans, monitoring and assurance

7.2.54 Once the Climate Resilience Risk Register has been formally adopted by the establishment, the risks and actions identified should be embedded within the establishment's own management processes (e.g. management plans etc. and structures e.g. SHEP committee; IEMP review. It is the responsibility of the HoE to ensure the site risk action owners are aware of their assigned risks and these are addressed in their own processes and procedures. These processes may include (Box 7.10):

- Business Continuity;
- Security;
- Integrated Estate Management Plans, Integrated Rural Management Plans Establishment Development Plans and Strategic Development Plans;
- Forward Maintenance Registers;
- Health and Safety;
- Environmental Management Systems (EMS);
- Establishment Command; and
- Training providers.

7.2.55 The Climate Resilience Risk Register should inform short, medium and long-term resilience actions and allocation of funding balanced against affordability and risk appetite by the TLB. The impacts and risks identified by the assessment will be direct effects on the ability to operate and deliver defence capability and should be weighted on that basis.

7.2.56 Funding for further research, adaptation measures etc. lies with the relevant budget owner. Funding issues should be flagged up to the TLB CCAFP at the earliest opportunity.

7.2.57 The HoE should ensure any life-cycle replacement is climate proofed based on the risk level (some may be linked to a statutory requirement). This should be reflected within any Statement of Need for the Industry Partner to deliver.

7.2.58 Not all adaptation measures will require injected funding to build in resilience instead will require increased liaison, cooperation with service providers or adopting new procedures and new ways of working.

7.2.59 The owner for some risks and adaptation measures will not lie with the establishment but will require a response from another department within MOD. These areas include:

- Strategic Estate Planning;
- Equipment as specification and location of equipment may need to change;
- Partnering arrangements may need to be improved in order to facilitate adaptation;
- Health and Safety Policy. Department's central H&S policy may need to be reviewed;
- Personnel Policy. Departmental personnel policy and working practices may need to be reviewed;

- Infrastructure Design and Construction. Core works specifications may need to be future climate proofed; and
- TLB Command Plans. Operational activities of site may need be revised in a changing climate e.g. increased civil assistance.

7.2.60 It is important that these issues are flagged up to the TLB Climate Change Adaptation Focal Point who will then inform the Climate Change Adaptation Focal Point within DE Property Directorate. These issues will then be raised and taken forward to be addressed by the relevant owners.

7.2.61 Guidance on adaptation measures and how to efficiently embed adaptation in to existing processes will be made available from DE Property Climate Change Adaptation Focal Point. This will be made available on the DE SD Portal.

Monitoring and Review

7.2.62 Each risk action owner at the establishment is responsible for monitoring the delivery of their actions. The HoE will be required to report annually to the TLB CCAFP on progress in adaptation action delivery. A reporting requirement may also be required from the individual process chains e.g. Business Continuity to assure climate change adaptation has been considered.

7.2.63 Provisions should be made by the TLBs to ensure that the HoE reviews and revises the risk register on an annual basis, in the same way as EMS or Business Continuity. This allows the delivery of actions, the provision of new information etc to inform the risks and their scores. Adaptation measures may also need to be reviewed accordingly. This also allows for continuity given changes in personnel and contractual arrangements at site level. A full establishment CIRAM assessment should be repeated on a five year basis.

Box 7.10 Examples of Risk Adaptation Processes	
MOD ESTATE PROCESS	**Risk Action Owner's Responsibilities**
Business Continuity Plan	The BC owner should ensure the relevant BC risks identified e.g. Heatwave disrupting IT/comms are reflected in the establishment BC Plan and cascaded down into team plans etc.
Health & Safety	H&S owners should ensure any SHEF risks identified are reflected within their standard risk assessments and provide assurance that Health, Safety and Environmental legislation, Codes of Practice and MOD/TLB Policies will be compiled with.
Site Security Risk Management	The owner needs to ensure that any security related risks are reflected within the establishment security risk management plan.
Strategic Development Plan (SDP)	The strategic development of a cluster of establishments should consider any climate risks when planning for operational needs, rationalisation and co-operation between sites. The SDP should examine how climate risks will on the maintenance, through life costs of the establishments. The financial plan, supporting the SDP should forecast any adaptation costs required maintain resilience in the short, medium and long term.
Establishment Development Plan (EDP)	The EDP should also reflect any relevant climate risks. These risks register should inform the identification of the establishment's current threats and constraints, and any issues relating to the future use of land and infrastructure.
Estate Management and IEMP	The estate manager should ensure any relevant CIRAM outcomes are embedded within the IEMP. CIRAM should inform the prioritisation of condition improvement actions.
Core Works and Minor New Works	Core works, minor new works and core service projects should take into account climate projections and if a CIRAM assessment has been undertaken, then the outcomes should inform the location, design, construction etc. of the asset.
Strategic Estate Planning DEDP	CIRAM assessments can inform strategic planning of the MOD estate, identifying opportunities to rationalisation and re-development opportunities. Consideration should be given in high risk areas e.g. flooding or coastal erosion. Opportunities may arise to manage risks in partnership with local and regional bodies.
EMS	EMS should embed any relevant CIRAM and ensure any actions are implemented and monitored accordingly e.g. issues concerning discharges.