



Maritime and Coastguard Agency

CLIMATE CHANGE ADAPTATION REPORT

Index

- 1. The Agency**
 - 1.1 Statutory Obligations
 - 1.2 Regulatory Obligations
 - 1.3 Resources
 - 1.4 Other Functions
 - 1.5 Aims and Objectives
 - 1.6 Stakeholders

- 2. Assessment of Current & Predicted Impact of Climate Change**
 - 2.1 Factors Influencing Risk
 - 2.2 How Climate Change affects our Aims and Objectives
 - 2.3 Methodology
 - 2.4 Risk Register
 - 2.5 Identified Risks

- 3. Proposals and Policies for Adapting to Climate Change**
 - 3.1 Managing Risks
 - 3.2 Adapting to Increased Risks
 - 3.3 Future

- 4. Uncertainties and Assumptions**
 - 4.1 Natural Climate Variability
 - 4.2 Modelling Uncertainty
 - 4.3 Emissions Uncertainty
 - 4.4 Increase in Extreme Weather Events
 - 4.5 Increased Rainfall
 - 4.6 Rising Sea Levels

- 5. Barriers/Opportunities to Adaptation**
 - 5.1 Funding
 - 5.2 Consent or Approval
 - 5.3 Continuous Review
 - 5.4 Communication
 - 5.5 The MCA's Reputation
 - 5.6 Interdependencies

- 6. Monitoring and Evaluation**

GLOSSARY

BREEAM	Building Research Establishment Environmental Assessment Management
CHP	Civil Hydrography Programme
COBR	Cabinet Office Briefing Room
COLREGs	International Regulations for Preventing Collisions at Sea
CRO	volunteer Coastguard Rescue Officer
CRS	volunteer Coastguard Rescue Service
CRT	volunteer Coastguard Rescue Teams
DfT	Department for Transport
IMO	International Maritime Organization
MARPOL	International Convention for the Prevention of Pollution from Ships
MCA	Maritime and Coastguard Agency
MLC	Maritime Labour Convention
RNLI	Royal National Lifeboat Institution
RoW	Receiver of Wreck
SAR	Search and Rescue
SOLAS	Safety of Life at Sea Convention 1974
STCW	Standards of Training, Certification and Watchkeeping for Seafarers
UKCIP	UK Climate Impacts Policy (2002)
UKCP	UK Climate Projections (2009 Report)
UKSAR	United Kingdom Search and Rescue

1. The Agency

1.1 Statutory Obligations

The Maritime and Coastguard Agency (MCA) contributes to the development and implementation of the Government's maritime safety strategy to prevent loss of life at the coast and at sea, to ensure ships are safe and to prevent coastal pollution.

We carry out checks on ships to ensure they meet UK and international safety regulations. We coordinate 24 hour search and rescue at sea through Her Majesty's Coastguard and are responsible for the initiation and coordination of all civilian maritime Search and Rescue (SAR) within the UK Maritime SAR Region. This includes the mobilisation, organisation and tasking of adequate resources to respond to persons either in distress at sea, or to persons at risk of injury or death on the cliffs or shoreline of the United Kingdom. That response capability includes the deployment of around 3,500 volunteers in the 368 teams that make up the community-based Coastguard Rescue Service (CRS).

1.2 Regulatory Obligations

We also have a responsibility for the implementation of international maritime conventions and codes, the most important of which are:

- 1.2.1 SOLAS Convention 1974;
- 1.2.2 Convention on COLREGs, 1972;
- 1.2.3 International Convention of STCW, 1978, as amended;
- 1.2.4 International Convention on Maritime Search and Rescue, 1979;
- 1.2.5 International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 (MARPOL);
- 1.2.6 International Convention on Load Line; and
- 1.2.7 International MLC, 2006.

On average, each year we deal with 20,000 SAR incidents, 10,000 ship surveys and inspections, 18,000 ship and seafarer registrations and certifications, and prevent or respond to 650 pollution incidents.

1.3 Resources

Our Coastguard Coordination Centres act as area-based command and control centres for responding to reports of maritime and coastal distress. Rescue Staff provide a 24 hour service to mariners and coastal users, by receiving incoming distress calls, alerting the appropriate rescue assets, and coordinating the rescue effort. Under proposals currently out for consultation, a more resilient national network with fewer centres is expected to be implemented over the next five years or so.

Volunteer Coastguard Rescue Officers (CROs), who operate in 368 local Coastguard Rescue Teams (CRTs) around the UK, provide a front-line rescue capability to recover people from cliffs or mud, in addition to searching for anyone missing around the UK coast.

1.4 Other Functions

We will also assist other emergency responders inland where we can, in keeping with the ethos of UKSAR and of the Civil Contingencies Act 2004. However, this assistance is secondary to our primary tasks. If there is a clash of resource requirements, our primary responsibilities will take precedence, both in terms of planning and in response. Coastguards cannot, however, take on tasks, including response to flooding incidents, for which they are neither trained nor equipped.

1.5 Aims and Objectives

Our vision is to be the best maritime safety organisation in the world. We aim to be the most trusted global source of maritime competence and safety advice to industry and the public, committed to *Safer Lives, Safer Ships, Cleaner Seas*. We look to achieve this vision by delivering against three strategic themes, each of which improves maritime safety by:

- Positively influencing people, their behaviour and their attitudes;
- Improving the safety of the maritime working environment itself; and
- Carrying out emergency response and counter pollution activity.

These three delivery themes are supported by a commitment to efficient, effective and economic use of the resources which underpin our delivery capability. Our staff also adhere to the principles enshrined in the Civil Service Code and set out in our values of safety, professionalism, trust and respect.

More detailed information about what we do can be found in our Business Plan 2011-2015 available through our website at www.dft.gov.uk/mca.

1.6 Stakeholders

Our principle stakeholders are:-

- 1.6.1 The UK Government;
- 1.6.2 Other Government Departments and Agencies;
- 1.6.3 Search and Rescue associated bodies such as the RNLI;
- 1.6.4 General Public;
- 1.6.5 Our Staff and Volunteers;
- 1.6.6 International Maritime Organization (IMO); and
- 1.6.7 Foreign Maritime Agencies.

The MCA is an executive Agency of the Department for Transport (DfT): working with our partners, we support economic growth and minimise environmental impact through the development and implementation of the Government's maritime safety and environmental strategy. We also consult with our stakeholders when developing legislation, policies and practices.

Where appropriate and proportionate, we follow Her Majesty's Government's Code of Practice on Consultations and will publish risk and impact assessments on our website. In the future, we expect those assessments to pay increasingly closer

attention to the impact of climate change. Our current proposals for the future location of Coastguard Coordination centres already take account of climate change predictions for the expected lifecycle of the project (25 years).

2. Assessment of Current & Predicted Impact of Climate Change

2.1 Factors Influencing Risk

In July 2009 the 'UK Climate Impacts Programme' (UKCIP) published the latest scientific projections (*UK Climate Projections 2009 - UKCP09*) for the UK's climate to 2099. The data uses the Met Office Hadley Centre's climate modelling to create climatic scenarios across the UK.

Using *UKCP09* and previous scientific data such as *UKCIP02*, DfT has determined what key climate change factors may create risks and implications for transport. Those that we need to manage are outlined below:

1. Increased rainfall;
2. Increase in extreme weather events e.g. storms, storm surges and long periods of hot weather; and
3. Rising Sea Levels.

The implications these have for us are outlined in the table below:

Factors Influencing Risk	Implications for the MCA
(a) Increased rainfall; (b) Increase in extreme weather events e.g. storms, storm surges and long periods of hot weather.	May more immediately involve the CRS as part of its Category 1 Responder status in different climate-induced rescue scenarios; may impact on our ability at one or more sites to provide normal services (such as flash floods). The Met Office will need to respond with quicker forecasts for the suddenness of the weather, which may increase our costs. More violent storms may also increase the mobility of the seabed, widening the routine re-survey area. This means less survey work will be conducted in other poorly surveyed priority areas, given a fixed (and reducing) resource.
(c) Rising sea levels.	May over time change the nature and location of the services we currently provide, and the siting of our infrastructure underpinning that provision (such as remote radio sites and CRT bases). Rising sea levels may also affect port operations and, as some jetties and wharves become unusable, ports may be tempted to use older facilities, adversely affecting safety and perhaps pilotage.

The types of risks under (c) can be anticipated to some extent and will be managed through normal local Business Continuity Plans.

Unlike these and other predictable risks associated with, for example, outages of power, or the catastrophic and sudden loss of facilities, for which our Business Continuity Management Policy has been developed, the type of Climate Change risks under (a) and (b) above will develop over a lengthy period of time (perhaps decades) and plans can take account of them well in advance of the risks materialising.

2.2 How Climate Change Affects our Aims and Objectives

Our preparedness for and response to climate change involves the functions of business planning, resilience, Business Continuity Planning, sustainable development and estates management. All Business Continuity plans, and all Business Plans will take account of adaptation needs, and all estate requirements for the future organisation of the Coastguard will take account of climate change.

The high level plan recognises the challenges presented by the anticipated impacts of future climate change. It describes what we are doing to respond to these challenges, so that we can continue to provide our core services:

- A maritime emergency response (CRS/counter pollution) and search and rescue coordination service;
- A ship survey and inspection service;
- Certification services for seafarers;
- Management of the UK Ship Register; and
- Developing and implementing ship and seafarer safety standards.

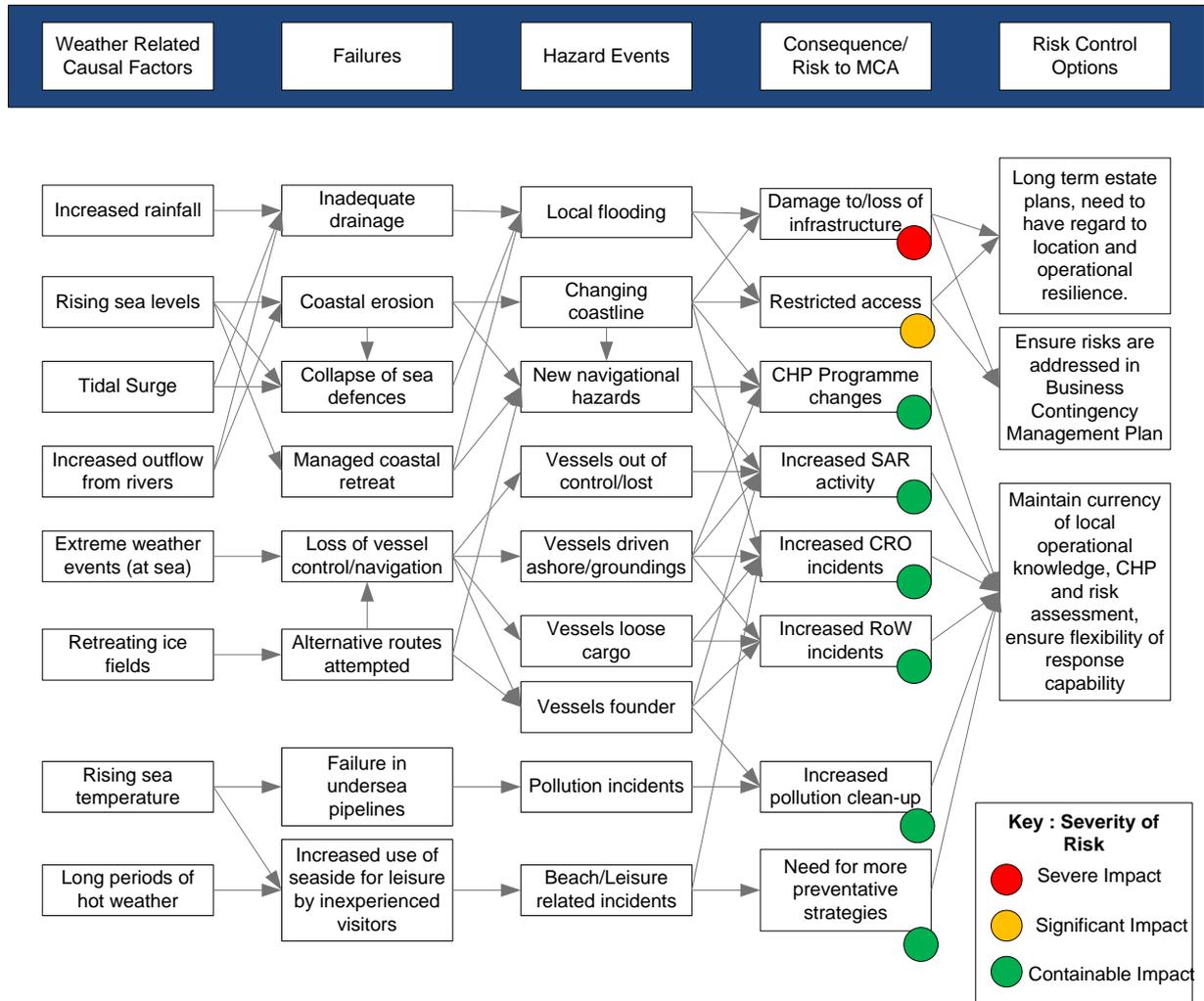
2.3 Methodology

We have taken a more scenario-based approach in our analysis of what the key climate change factors are which may create risks and implications for the MCA. The criteria used to characterise the significance of the risks is based on how they may affect our core services, as outlined in section 2.2.

Since this is our first attempt at assessing these risks against scenarios that are largely speculative at this stage in the evolution of climate change, we make no great claims about the level of confidence we have in the assessments. We expect that confidence to grow with future updates of this Plan, as the reality of climate change firms up and the horizon of its impact gets closer. The exception to that is in relation to flash floods and other extreme, but short-lived weather events, for which we already have practical experience and can therefore have much greater confidence (perhaps as high as 70%) in the risk assessments that we have made.

2.4 Risk Register

The following pictorial table illustrates a chain of events that extreme weather conditions, increased rainfall and rising sea levels may induce. The fourth column sets out how this could impact on our work, and the final column describes our risk mitigation approach.



Climate Change FSA : Version2 (November 2009)

The following risk register describes the risks as we foresee them in 2020:

No.	Climatic Risk	Consequence	Risk Estimation (prior to Mitigation)		Mitigation	Risk Estimation (post Mitigation)		Further Actions
			Probability	Impact		Probability	Impact	
1	Increased Rainfall	<p>Coastal and Inland Flooding – may require additional support from emergency services, such as HM Coastguard.</p> <p>This could lead to an increase in expectations and demands on the CRS, and could divert resources away from their primary task.</p>	Low	Medium	<p>Keep under close review the support that CRTs can offer, subject to their primary operational requirements.</p> <p>Gain clarity of roles and responsibilities across the emergency services.</p>	Low	Low	<p>Monitor climate change predictions.</p> <p>Work with other Government Departments on roles and responsibilities.</p>
2	Increase in Extreme Weather Events	<p>Potentially could increase the number of maritime casualties.</p> <p>Increase to coastal flooding.</p> <p>Increase in coastal leisure activities.</p> <p>All of these will have an operational impact.</p> <p>Could increase the mobility of the seabed, widening the routine re-survey area.</p> <p>Expense – Met Office will need to respond with quicker forecasts for the suddenness of the weather.</p>	High	Medium	<p>We will continue to inform the public and industry, asking them to pay greater attention to weather forecasts. We will also provide information to help customers cope with extremes of weather.</p> <p>Continuously assess through our Business Plan process.</p>	High	Low	<p>Monitor climate change predictions.</p>

No.	Climatic Risk	Consequence	Risk Estimation (prior to Mitigation)		Mitigation	Risk Estimation (post Mitigation)		Further Actions
			Probability	Impact		Probability	Impact	
3	Rising Sea Levels (and Ice Melt)	<p>Estate may no longer be viable, creating an inability to provide our statutory and other functions.</p> <p>Future access to incidents may also be an issue, disrupting our operational delivery.</p> <p>May affect port operations; jetties and wharves may become unusable – ports may be tempted to use older facilities, adversely affecting safety, and perhaps pilotage.</p>	LOW	LOW	Continuously assess and embed into our long-term estates management, taking into account specific SAR resources, such as helicopters.	LOW	LOW	Monitor climate change predictions.
4	Staff Health	Extremes of both hot and cold weather could make our staff more prone to illness. This may lead to us being unable to obtain our functional commitments.	High	Medium	<p>Encourage active wellbeing through campaigning and awareness, providing advice support and information.</p> <p>Build a proactive sickness management Plan.</p>	High	Low	Monitor weather and sickness levels, and find any identifiable trends.

2.5 Identified Risks

Risk 1

Sustained increased rainfall (or rising sea levels) could result in there being more instances of coastal and inland communities needing additional support from the emergency services, including HM Coastguard. This will potentially put additional expectations and demands on the CRS and could divert resources away from its primary task.

Risk 2

As a result of extreme weather events (e.g. storms, flooding and longer periods of hot weather) we might expect to see an increase in maritime casualties at sea, more people involved in leisure activities at beaches and getting into difficulty and greater inland flooding, all requiring rescue coordination and response. This will put an additional burden on our search and rescue resource.

The Met Office will also need to provide us with faster forecasts, to account for the suddenness of the weather. In addition, more violent storms may increase the mobility of the seabed, widening the routine re-survey area. This means that there will not only be an increased cost, but conducting a re-survey will mean there are limited resources for conducting surveys in other poorly surveyed priority areas.

Risk 3

As a result of rising sea levels, our estate may no longer be viable, leading to an inability on our part to provide our statutory and other functions. There may also be future difficulties in rescue teams being able to access some areas which are then under water.

In addition, rising sea levels may affect port operations and, as some jetties and wharves become unusable, ports may be tempted to use older facilities, adversely affecting safety and perhaps pilotage.

Risk 4

There is also the potential for our staff to become more prone to illness as a result of extremes of both hot and cold weather. This may result in the us being unable to maintain our functional commitments.

3. Proposals and Policies for Adapting to Climate Change

3.1 Managing Risks

We regularly review our infrastructure which allows for the coordination of maritime emergency response and ships survey and inspection (safety). The location of our Coastguard Coordination Centres, Marine Offices, and CRT sites are suitable to continue to provide their current functions of coordinating resources for search and rescue.

Work is already in hand to consider the future requirements for both the Coastguard Coordination Service and the Coastguard Rescue Service. A consultation is currently being carried out about the future locations. All proposed locations have been chosen so they are not affected by climate change for the expected lifecycle of the current programme (25 years).

Similarly, climate change predictions and likely scenarios will be built into our Business Plans, which will consider both short and medium term Business Planning and the evolution of our Sustainable Development Action Plan. Business Continuity Plans will take account of risks posed by extreme weather events and, over time, will increasingly recognise the realities of climate change as the time horizon for predicted impacts gets closer.

3.2 Adapting to Increased Risks

We will also recognise the potential for increasing demands on the volunteer CRS inland, in support of more extremes of weather. The CRS and the Coastguard SAR helicopters provide practical support in the exceptional weather events, such as the 2005 Carlisle floods, the 2007 Gloucester floods, the 2009 Cumbria floods, and the 2010 and 2011 snow and ice incidents around the UK.

Work in flood waters of any type carries specific and sometimes severe risks. Flood waters can be heavily contaminated with chemicals, sewage, debris etc; unprotected rescuers are at high risk of injury or illness. Flood hydrology and hazards need to be fully understood by those working in flood waters or they run a high risk of becoming casualties themselves. In general, HM Coastguard personnel are not trained in this specialist area of emergency response work, and volunteer CRTs are usually not equipped to respond to such incidents.

There are specific exceptions to this general position. Some Coastguard personnel have been trained and equipped to operate in defined areas of high flood risk. These officers may operate up to, but not beyond, the level to which they have been trained, equipped and formally accredited, and they may only operate within defined geographical areas.

On the other hand, HM Coastguard has a great deal to offer to an integrated emergency response in incidents such as:

- **Communications** – There is a reliable and robust communications network which can be used to assist other services, especially with regard to coordinating maritime rescue assets being used inland;

- **Helicopter landing sites** – CRTs are equipped and trained to set up and staff landing sites in support of helicopter operations;
- **Search** – CRTs are well equipped for, and trained in, land search operations;
- **Basic first aid/evacuation** – CRTs are trained in basic first aid, casualty care, stretcher evacuation and staffing casualty landing sites. Teams can be used to treat and evacuate those being brought out of areas of flooding or to evacuate the vulnerable from the threat of flooding. This is an important support role which frees up dedicated flood teams to remain in the flood area;
- **Rope rescue** – CRTs can provide rope rescue;
- **Water rescue** – CRTs can provide water rescue;
- **Logistics** - manpower, 4x4 transport, lighting, communications (radio and public address systems), and generators.

We continue to consider how we might extend the current provision, should resources allow and in the light of experience. It must be understood however, that the priority is to maintain a clear focus on existing primary responsibilities.

We took part in Exercise Watermark from 4 - 11 March 2011, which was a demonstration to test emergency response to a flooding scenario. It was one of the largest emergency exercises ever undertaken in the UK, and was designed to test the country's preparedness to respond to severe, wide area flooding. The country's response was tested at all levels from local communities to government's highest crisis response committee - COBR – which is chaired by the Prime Minister or a Cabinet Minister. The final report on the exercise however, will not be available until September 2011.

3.3 Future

As decisions are needed about our future estate requirements, climate change factors will be taken into account, particularly in relation to rising sea levels. Where a property is identified as being in an area of higher risk, we will seek the advice of our property consultants and other experts and ensure that our plans fully reflect any identified or elevated risk.

Any major build will be built to BREEAM (the Environmental Assessment Method for Buildings Around the World) standards and will include a full assessment of the risks associated with climate change. This will also minimise environmental impact by ensuring sustainability best practices are in place while also lowering our costs through energy efficiency.

Any acquired properties will be fully assessed as part of the overall acquisition process so that any elevated risks are known and documented before completion and an ongoing process is put into place.

4. Uncertainties and Assumptions

Uncertainties in climate change projections can create a significant problem for those planning to adapt to climate change. These arise from three main sources: natural variability and the degree to which we can model these effects for the future, uncertainty in our understanding of the climate and how we can simulate it in models, and the uncertainty in future emissions. In the future, we may reduce the uncertainty through further understanding of the climate and subsequently reducing the uncertainty of models, however this is a long term aim.

These uncertainties are expanded below, along with the uncertainties which impact our risk from climate change:

4.1 Natural Climate Variability

This arises from both internal and external factors on the climate system. The effects of natural internal factors on climate variability are taken into account as part of modelling uncertainty (see below). It is difficult to estimate internal factors as variability relates to temporal and spatial changes in scales beyond that of an individual weather event, due to natural internal processes within the climate system. However, the effect of natural external factors, such as volcanic eruptions and variations in solar activity, remains an uncertainty as it cannot be formally incorporated into the UKCP09 projections used in this report.

4.2 Modelling Uncertainty

We are unable to model the climate perfectly, as there is an incomplete understanding of Earth system processes and their affect on the climate system. Variations in model parameters relate to oceanic and atmospheric processes, and the Carbon and Sulphur cycles.

It is impossible to incorporate each physical process affecting the climate system into a climate model, because the processes involved are too fine a spatial resolution to be included in a model, due to IT constraints. Parameters are assigned to represent these processes, however this itself leads to a component of modelling uncertainty.

4.3 Emissions Uncertainty

The data used presents the probabilistic projections of future climate change. However, uncertainty arises as it is not possible to know the amount of future global greenhouse gas emissions. As a result, it is uncertain how much these gases exacerbate the natural greenhouse effect, and lead to an overall global warming affect.

4.4 Increase in Extreme Weather Events

Both the position and strength of present day storm tracks create uncertainties, and these contribute to the large uncertainties regarding future predictions of storms. The

modelling method used in *UKCP09* assumes that changes in storm surge height are independent of changes in average sea level. However, there are considerable uncertainties about a realistic upper limit of extreme high water level, due to increased storminess and the unknown increase in the contribution of ice melt to the sea level.

There is also an element of uncertainty with regard to extent to which temperatures will change in the future. Climate projections suggest that summer temperatures will rise by approximately 4°C in southern England, but only about 2.5°C in parts of northern Scotland. In winter however, the change projected is expected to be between 2 - 3°C across the majority of the UK. Further uncertainties in the predictions arise from the effects of land and ocean carbon cycle feedbacks, natural variation and modelling uncertainty.

4.5 Increased Rainfall

The UK has experienced an increased amount of winter rain that falls in heavy downpours. Central estimates show that the level of precipitation will increase by 6% by the 2020s, 10% by the 2040s and 16% by the 2080s for the North West of England. Like with the increase in extreme weather events, further uncertainties in the predictions will also arise from the effects of land and ocean carbon cycles, natural variation and modelling uncertainty.

4.6 Rising Sea Levels

Over the 20th Century, sea levels around the UK have risen by approximately 1mm per year, although recent rates are slightly higher. It is estimated that we can expect an 18cm sea level rise in London by the 2040s, rising to 36cm by the 2080s. There are considerable uncertainties regarding the upper limit of sea-level rise. This also arises from, for example, unknown increases in the contribution of ice melt and the increase in average sea temperatures.

5. Barriers/Opportunities to Adaptation

Barriers

5.1 Funding

As a result of climate change, we may need to increase our spending with regard to estate and possible local training requirements. In addition, further funding may need to be sought for additional/faster forecasts from the Met Office, and to re-survey areas that have been affected by violent storms. Funding therefore creates a barrier, as we are wholly reliant on Government allocation.

However, our funding is agreed for the period ending 31 March 2015 and we do not anticipate difficulties at this time. Funding beyond 2015 will be a matter for future Comprehensive Spending Reviews and cannot be anticipated within this Plan.

5.2 Consent or Approval

As all of our finances come from Government spending, we need to put forward strong justification on estate and general expenditure. We also cannot predict fiscal activity.

Opportunities

5.3 Continuous Review

Our adaptation to climate change plan means that we will continuously review our estate and business plans, making them more robust.

5.4 Communication

As we could potentially be more involved in future flood rescue (subject to our primary requirements), this will lead to increased communications and therefore relationships with other Government Departments.

5.5 The MCA's Reputation

There is also the potential for the enhancement of our reputation as a result of climate change, as a large part of mitigation will include an increase in safety awareness.

5.6 Interdependencies

As time progresses and the realities of climate change evolve, we will need to be alive to the interconnectivity and interdependency of risks, barriers and opportunities in relation to our approach to adaptation. For the purposes of this first Adaptation Plan, these matters are largely viewed as independent factors, but we may find, for

example, that extreme weather incidents impact on the ability of our partner organisations to provide a service and therefore has a knock-on effect on our ability to provide a service. Similarly, an unforeseen maritime disaster may require a much greater diversion of our resources into a particular activity, but without additional funding being made available from the public purse. That will require choices to be made about priority activity and could, for example, limit our ability to support other emergency services in the relief of severe weather events inland. Keeping this Plan under regular review and recognising the impact of events and impacts beyond our direct control will be important.

6. Monitoring and Evaluation

The impact of climate change has already been recognised by the MCA and our approach is being managed through a bespoke Adaptation to Climate Change virtual Team made up of:

- Head of the Office of the Chief Executive (who supports the Executive Board on all matters associated with Business Continuity Management);
- Head of Research and Planning;
- Head of Resilience;
- Sustainable Development Manager;
- Head of ICT Infrastructure; and
- Head of Workforce Planning.

This team will develop plans, review developments and offer assurances and recommendations to our Chief Executive about the extent to which we have taken the need for climate change adaptation into our plans, in order to continue to provide our core services:

- A maritime emergency response (CRS/counter pollution) and search and rescue coordination service;
- A ship survey and inspection service;
- Certification services for seafarers;
- Management of the UK Ship Register; and
- Developing and implementing ship and seafarer safety standards.

While it is evident from this report that climate change will not have a significant impact on our statutory and other functions, we will need to continue to review our Business and Sustainable Development Action Plans, together with our Business Continuity Plans and other documentation, building in both short, medium and long term adaptation plans relating to climate change.

Ordinarily, this Plan will be formally refreshed every five years, unless it becomes clear in light of events that a review should be carried out more speedily.