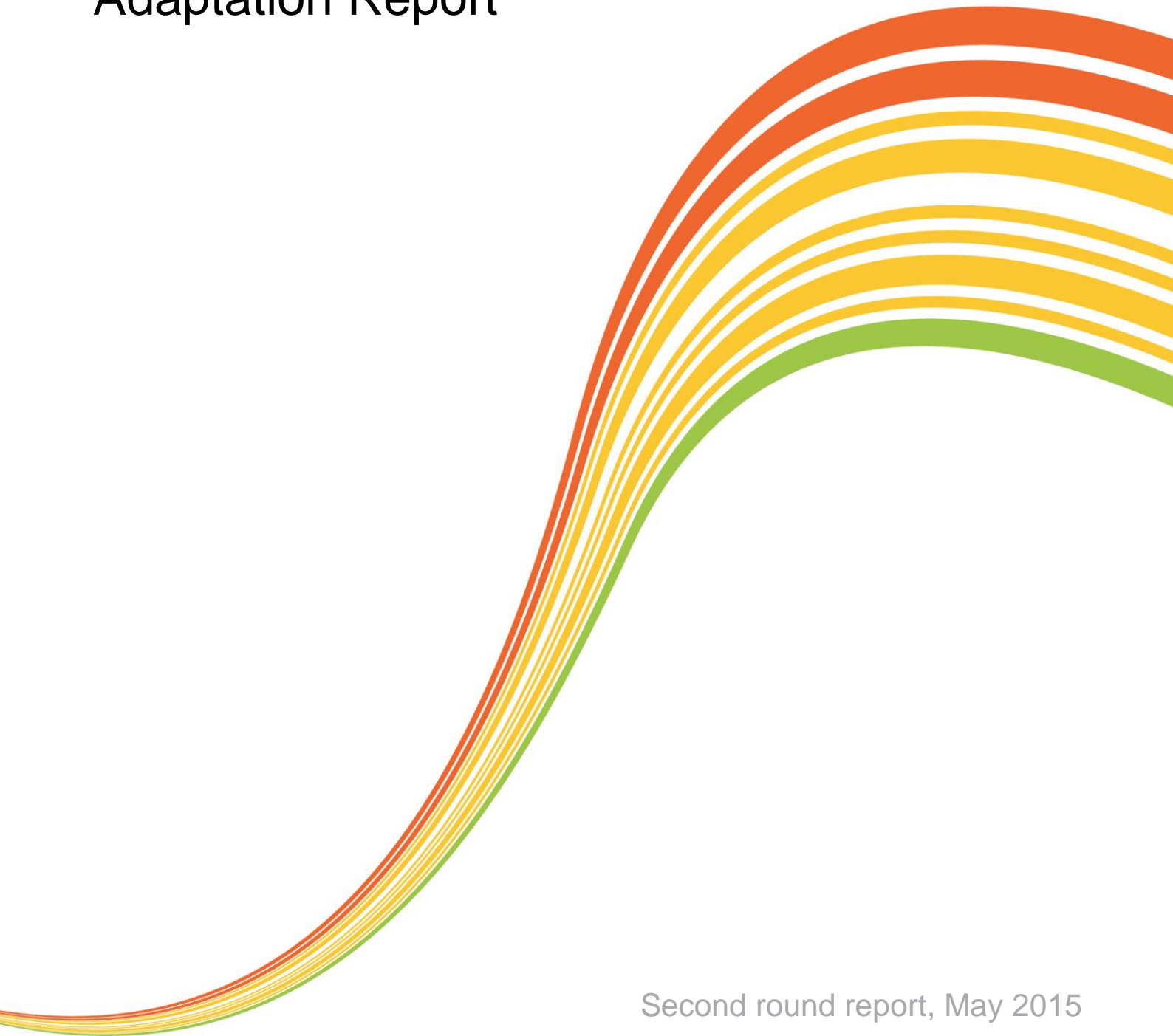


Climate Change Adaptation Report



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Executive Summary

The Climate Change Act 2008 gives the Secretary of State the power to direct ‘reporting authorities’, including bodies with functions of a public nature and statutory undertakers, to produce reports on their progress towards adaptation. As a statutory water undertaker, South East Water (SEW) is one of a number of ‘priority reporting authorities’ who were directed by the department for environment, food and rural affairs (Defra) in 2011 to report on the impacts to the company’s functions presented by climate change as well as any plans for adapting to those impacts. More information on this direction can be found in Appendix A. Working on our behalf; Atkins Limited successfully compiled the report in January 2011¹.

During July 2013, under the Climate Change Act 2008, Defra laid before Parliament a report entitled ‘2013 Strategy for exercising the adaptation reporting power and list of priority reporting authorities’. This set out how government will use the Adaptation Reporting moving forward. The strategy set out that a voluntary approach to reporting will be implemented for the second round instead of issuing a statutory direction. The aim of this second round of reporting is to provide an understanding of adaptation planning in South East Water and the extent to which adaptation actions are being considered and implemented. This will feed into the next national adaptation programme (NAP). This report has been prepared to support the government’s assessment of impact that the voluntary reporting process has to support organisations build their climate resilience. The direction letter for the second round of reporting can be found in Appendix B. Although voluntary, we have welcomed the request by Defra to produce a progress report on our progress on monitoring and understanding climate change risk and adaptation. Following the guidance as set out by Defra in December 2013, we have answered each question raised by the template as well as addressing any issues raised in the feedback on the first round report.

The first round report was well received and feedback outlined several areas where we had demonstrated good practice and that we had clearly shown consideration of climate change risks were embedded into numerous aspects of the company’s functions. This feedback also included analysis of a few potential areas for further work. The feedback on the first round report is summarised in Section 2. This section also outlines the actions we have taken to address areas that were identified as requiring further work in the first round report.

¹ Atkins Limited. January 2011. South East Water; Defra Reporting on Adaptation to Climate Change, Full Report. Atkins Limited, Epsom.

Section 4 and Section 5 address all of the questions raised within the guidance issued by Defra in December 2013. These sections outline the methods we have used to monitor and review climate change risks as well as demonstrating how our understanding of climate change risks have developed since the last round of reporting in 2011. These sections outline four notable areas of development that have occurred since the submission of the first round report in 2011, namely:

- Embedding and quantifying climate change into our routine management and monitoring of risks - Using the latest available information, a significant amount of work has been undertaken since the first round report was published in order to accurately and thoroughly assess and monitor climate change risks and their impact upon our different business functions. Climate change risks are reviewed on a regular basis in line with our internal risk management process. This includes the assessment of risk likelihood, risk impact analysis and the monitoring of the effectiveness of business controls that we currently have in place.
- Updated assessment of climate change impacts on water supply and demand – Assessments have been carried out using the latest data from UKCP09². Our supply and demand forecasts have been updated in line with the updated WRMP14. This has also allowed us to quantify our sensitivity to climate change as well as identify the thresholds at which we are affected.
- Greater collaborative long term planning and understanding of regional impacts – We have worked closely with local planning authorities to develop a robust understanding of population and property forecasts to use in our assessments of climate change impacts on supply and demand under UKCP09; to explore adaptive measures such as raising awareness and promoting efficient use of water. We successfully completed collaborative modelling work with the WRSE³ group to assess ‘in combination’ regional impacts of climate change on our respective supply and demand forecasts using UKCP09, and then to explore the resilience and adaptive capacity of different regional strategies and solutions.
- Experience of recent winter storms and floods - During the severe winter storms of 2013, we were able to quantify and validate the level of resilience and adaptive capacity that our current infrastructure provided under a series of intense rainfall events and prolonged wet weather that was comparable with a 1 in 200 year level of severity. This has led to a better understanding of surface water and groundwater flooding in close proximity to our assets and quantification of potential water quality issues that were built into our future plans.

Section 6 outlines all of the uncertainties and information gaps we have encountered when analysing the climate change risks faced by the company as well as steps that have been taken to minimise the negative impacts of such assumptions.

² United Kingdom climate projections 2009.

³ The Water Resources in the South East Group is made up of the following water companies: South East Water, Thames Water, Southern Water, Portsmouth Water, Sutton and East Surrey Water, Affinity Water.

In assessing climate change risks, we have identified three key areas we consider climate change outside of this report, namely;

- Internal risk assessments – We have developed a rigorous risk monitoring process in order to ensure that all risks, including those caused by climate change impacts, are assessed and monitored on a regular basis. More detail on the methodology behind this process can be found in Section 4.
- Regulatory – The updated water resources management planning and price review processes are crucial to our ability to accurately assess climate change impacts as well as our ability to adapt to such changes. These processes are referred to numerous times throughout the report.
- Embedding climate change into decision making processes - Several key business functions within our company successfully incorporate consideration of climate change impacts. For example, our asset management programme includes climate change projections in conjunction with the impact climate has upon assets into asset life calculations.

Section 7 outlines all of the adaptation actions we have identified during the previous round of reporting in 2011. Only risks deemed to be significant from the risk scoring exercise undertaken in Section 4, Section 5 were carried forward to the optioneering process for adaptation options as part of this report. Section 8 addresses the potential barriers facing the successful implementation of adaptation options as well as the identification of interdependencies with key stakeholders of each option. The effectiveness of adaptation options included within this report has been assessed using the same robust methodology as outlined in Section 4 of this report.

Identified as an area for further work in the feedback of the first round of reporting in 2011, we have ensured that as part of our internal risk review process, opportunities are also monitored and reviewed on a regular basis alongside risks. Greater detail on the potential opportunities arising from climate change that we have identified can be found in Section 10.

In summary, we continue to develop and review adaptive measures for climate change as well as closely monitoring our position relative to climate change risks via the processes mentioned within this report.

1. Company background

South East Water Ltd (SEW) is one of 18 regulated water supply companies in England and Wales. We operate 24 hours a day, 365 days of the year to provide high quality drinking water, water which is treated to the highest UK and European standards. Our supply area which covers some 5,657km of Kent, Sussex, Surrey, Berkshire and Hampshire is split into two regions, as shown in the map below. Around 40% of our supply area falls within designated and protected landscapes. Southern Water Services and Thames Water provide our customers with a separate service for the removal and treatment of wastewater.

Key facts about South East Water:

- South East Water is made up of eight water resource zones covering the following areas:
 - WRZ1: Tunbridge Wells.
 - WRZ2: Haywards Heath.
 - WRZ3: Eastbourne.
 - WRZ4: Bracknell.
 - WRZ5: Farnham.
 - WRZ6: Maidstone.
 - WRZ7: Cranbrook.
 - WRZ8: Ashford.
- Daily average demand of up to 540million litres
- Peak demand of up to 700 million litres on a hot summer's day
- 2.1 million customers
- 900,000 connected properties
- Over 14,000km of underground water main with more than 6,000,000 joints
- 198 service reservoirs
- Over 200 pumping stations
- Over 250 boreholes
- 83 water treatment works

Figure 1: Map of South East Water’s company boundaries



Climate change significantly impacts on the services provided by us to our customers. It affects what water is available in the natural environment around us, and also how much water, we as a society, use in our homes and businesses. We are particularly at risk due to operating in a region that is recognised as being in serious water stress and so is expected to feel the effects of climate change more acutely than other areas.

Despite recessions and changes in government, we continue to experience long-term policies that facilitate economic growth in the region, through the building of more homes to support a growing population.⁴ This leads to increases in the demand placed upon the region’s natural water resources.

In combination, these factors put increased pressure on finite water resources; and we are committed to looking at ways to both reduce the demand for water and to investigate new innovative ways of treating and delivering it. We believe there is a delicate balance between these two approaches, and so any decisions we make will be informed by our customers’ priorities and by what is best for the environment, particularly in the longer term.

⁴ A 20% increase in population (an extra 423,727 people) will be living in our supply area by 2040.

Customers' are at the heart of every decision we make for today and tomorrow's water supply service. South East Water therefore endeavours to ensure the provision of safe, high quality drinking water, with minimal interruptions in service, leaks kept to an absolute minimum, and all delivered at a price our customers can afford and are willing to pay. The impact of climate change upon several business functions poses a key challenge to delivering on these targets. This includes; lower rainfall, higher temperatures, extreme weather events, higher levels of solar incidence and air pollution to name a few. Therefore, it is imperative that we closely monitor and assess the impact climate change will have upon our business functions as well as ensuring that greater levels of resilience to climate change is embedded within the company to ensure that all customer demands are met.

In order to best respond to any threats or opportunities raised by climate change we consistently monitor the effect it would have on all of our business activities. Therefore, the Defra requirement to produce a report into the potential impacts of climate change on our functions and operations in 2011 was welcomed. Working closely with Atkins and Defra, the report was completed in January 2011 and was well received with a few, limited areas for improvement. This was further supported by the critical analysis of the report carried out by Cranfield University.

2. Feedback on first round report

Our first round report⁵ satisfied the requirements as set out in the Government's statutory guidance for the Adaptation Reporting Power and fulfilled the direction to report issued to us by Government. The report outlined our functions and identified how we could be affected by future climate change.

2.1. Examples of good practice

We included an appraisal of the adaptation options considered during the production of the report. This considered the costs and benefits, timescales, sustainability, carbon impact and potential level of regret associated with each possible action. This is something that very few organisations had considered and was highlighted as an area for us to share good practice with the wider industry and organisations in other sectors.

The report provided clear links between priority risks and adaptation actions. It also included general timescales for adaptation actions alongside resources to take them forward.

The risk assessment used a clear methodology to identify our priority risks and included an evaluation of the confidence in the data used to support the expert judgement. The report illustrated an understanding of the latest UK climate change projections including potential limitations, and the implications of the risk assessment results.

2.2. Potential areas for further work

The report contained a set of clear risk matrices that included details of the evidence used to support the risk assessment and an assessment in their confidence. The risk matrices however lacked details of the assessment of likelihood and assessed severity of any climate change impacts. In addition, the 2011 report would have benefitted from analysis of whether/ how our risks vary (i.e. temporally or spatially).

The report clearly illustrated that climate change is embedded in South East Water, through regulatory processes, but further details of how we manage our climate change risks (e.g. in our day to day decision making and planning processes) would have been useful.

The feedback report clearly recognised, as our own report had, a need to assess climate change risks using more quantitative studies. To help identify thresholds and develop robust adaptation plans.

⁵ Atkins Limited. January 2011. South East Water; Defra Reporting on Adaptation to Climate Change, Full Report. Atkins Limited, Epsom.

The feedback report pointed towards the need for further exploration of possible opportunities that may arise as a result of a changing climate, developing plans for exploiting them in the future.

Our first round report was also limited in exploring key interdependencies and how these may impact on our ability to deliver our goals. We recognised this is an area for further development to help minimise the risk of climate change.

2.3. Evaluating South East Water’s assessment of climate change attributes

Cranfield University, contracted by Defra, prepared a paper in March 2011 evaluating our first round report on adaptation to climate change. In Table 1, Cranfield University outlines the aggregated performance of our report on the key attributes of climate change. These results are also summarised by the radar chart in Figure 2.

Table 2 dives deeper into each key attribute and produces analysis of whether our assessment of climate change risk was adequate, rating the analysis of each attribute from ‘Not present’ (poor) to ‘Fully complete and integrated’ (excellent). Comments were provided with regards to each key and sub-attribute. This table also outlines areas where we have made progress in each area, which points have been addressed and how our approach has been improved upon.

Table 1: Defra evaluation of key attributes⁶

Key attribute	Not present	Partially complete	Complete	Fully complete and integrated
1. Climate change risk assessment is a clear component of corporate risk appraisal.				✓
2. Climate change risk assessment enables authority to make evidence-based decisions on adapting to climate change.		✓		
3. Demonstrable use of relevant and appropriate data, information, knowledge, tools and methodologies.			✓	
4. Climate change risk assessment and adaptation measures explicitly consider uncertainties.		✓		
5. Climate change risk assessment generates priorities for action.			✓	
6. Climate change risk assessment identifies opportunities (where applicable).	✓			
7. Clear demonstration of flexible adaptation measures.			✓	
8. Monitoring and evaluation of adaptation effectiveness.			✓	

⁶ Cranfield University. March 2011. Evaluating the Risk Assessment of Adaptation Reports under the Adaptation Reporting Power, Cranfield University, Cranfield, 17pp.

Table 2: Defra evaluation of sub-attributes⁷

Status	Sub attribute	Comments made on first round report	Progress made since first round report
Not Present	2.5 Reporting Authority presents all the organisation's strategic risks from climate change on a likelihood/consequence matrix, where possible including the climate thresholds above which climate change poses a threat to the organisation.	No evidence identified. The risk matrix has been assessed as no evidence identified because whilst it contains an overall risk classification it does not present the risk likelihood and consequence values/assessment from the risk scoring exercise.	Thresholds have been identified and assessed. The likelihood and impacts of risks are now assessed via the methodology set out in Section 4.4 of this report.
	2.6 Reporting Authority considers short, medium and long term risks of climate change disaggregated into different locations where appropriate, and includes an assessment of the level of confidence in these calculations.	No evidence identified.	This report identifies and assesses the spatial and temporal distribution of each climate change risk. The impacts of each risk have also been assessed in terms of time frames, most of which are assessed in line with the 25 year WRMP period.
	3.3 Reporting Authority's risk assessment includes consultation with interested parties or stakeholders.	No evidence identified.	Numerous consultations have taken place with internal stakeholders. Interdependencies (both internal and external) have been identified.
	6.1 Reporting Authority's risk assessment allows an evaluation of net benefits and/or opportunities arising from the impacts of climate change.	No evidence identified.	Opportunities have been identified and assessed as set out in Section 10 of this report.
	8.5 Reporting Authority offers evidence that the production of the risk assessment and adaptation plan has led to a change in the organisation's management of climate risks.	No evidence identified.	Climate change risks are deeply embedded within our business processes. Climate change risks and opportunities are assessed and reviewed on a regular basis. Greater detail can be found in Sections 4 and 9 of this report.

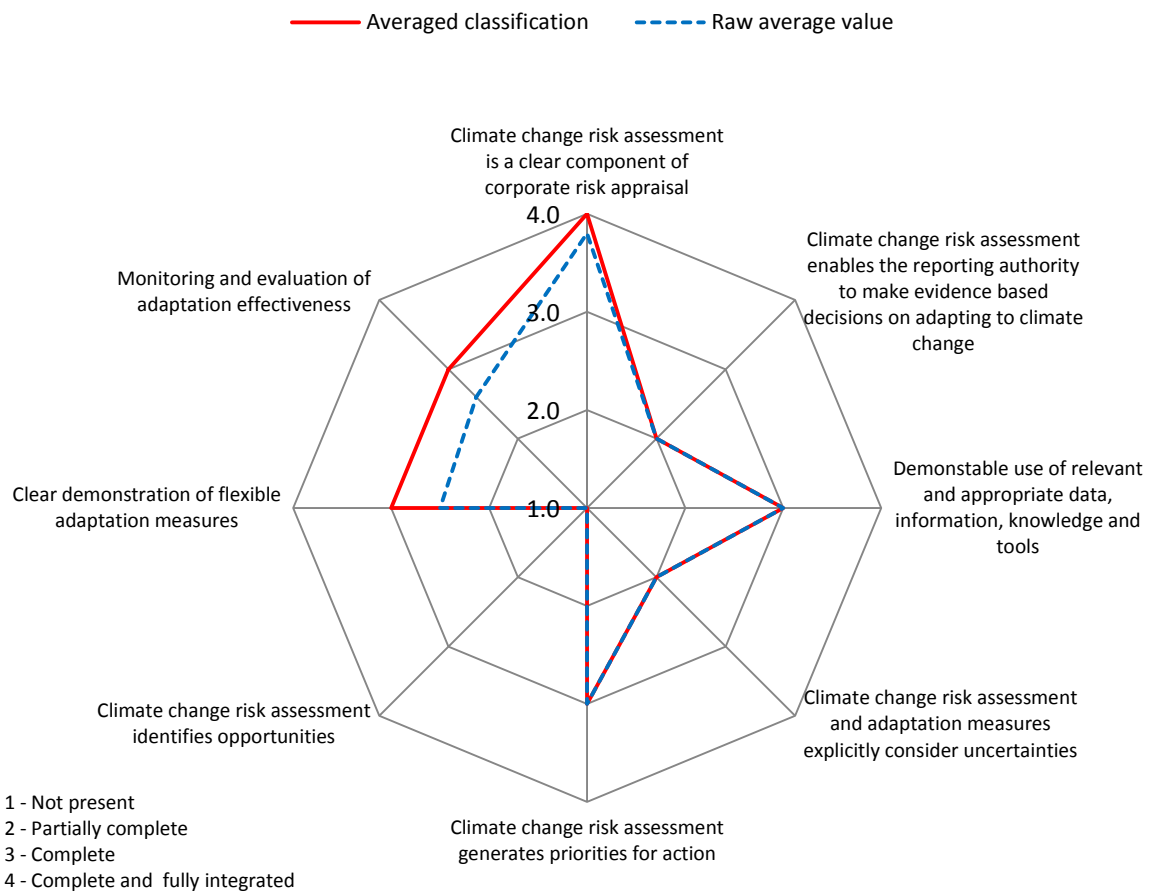
⁷ Cranfield University. March 2011. Evaluating the Risk Assessment of Adaptation Reports under the Adaptation Reporting Power, Cranfield University, Cranfield, 5pp.

Partially Complete	2.2 Reporting Authority identifies the key climate variables and their potential impact on the organisation.	Identifies some climate variables specific to organisation, but list is limited or method used to evaluate variables is not deemed fit for purpose.	Considerable work has been undertaken to identify all climate change risks posed to SEW. This has been completed by working with each department within the company to identify climate risks unique to certain business processes, and those shared between risk owners.
	2.3 Reporting Authority provides clear criteria for likelihood and consequence that are appropriate and specific to their organisation.	States risk appetite and vulnerability, without sound methodology.	The methodology now used to assess risk likelihood and impacts is robust and is outlined in Section 4.4 of this report.
	2.4 Reporting Authority's risk assessment quantifies, or otherwise estimates or characterises the impact and likelihood of risks occurring at various points in the future.	Generic estimates of impact and likelihood, without sound methodology.	As above. Distribution of risks have been identified and assessed. Most risks are assessed in line with the 25 year WRMP period. As the WRMP is updated every 5 years, this provides a moving event horizon by which climate risks can be assessed.
	4.1 Reporting Authority's risk assessment includes a statement of the main uncertainties in the evidence, approach and method used in the adaptation plan and in the operation of the organisation.	Identification of main uncertainties in the evidence, approach and method, but little/no consideration of how this affects the overall risk assessment.	Uncertainties are built into business control effectiveness scoring as outlined in Section 4.4 of this report. This in turn affects risk assessments and scoring.
	4.2 Reporting Authority's adaptation responses explicitly account for uncertainties and interdependencies of actions, including the actions of others on the adaptation plan.	Some indication of how the adaptation response can deal with uncertainty, and identification of other organisations that may impact on adaptation response.	Interdependencies have been identified and assessed. Interdependencies are described in greater detail in Section 8 of this report.
	4.3 Reporting Authority's adaptation plan includes a clear statement of assumptions which are well evidenced and justified.	Statement of assumptions within adaptation plan but not how these impact on the resulting actions.	Assumptions are included as a potential barrier to successful implementation of adaptation options.
	5.3 Reporting Authority's risk management actions are targeted to demonstrably reduce risks to a defined (by the organisation) level of residual risk.	Aims to reduce priority risks but proposed targets are limited or unsupported.	Mitigated risk targets have been formally assessed via the methods outlined in Section 4.4 of this report. We have outlined how adaptation options aim to reduce risk impacts incurred by the company.
	7.1 Reporting Authority's adaptation plan includes strategies to deal with the level of quantified risk and retains flexibility over which future course of action to follow as knowledge improves and projections change.	Adaptation plan identifies need for flexibility to respond to change, but no/ incomplete actions.	We have identified key areas which require flexibility in order to successfully implement adaptation actions. These include; regular interactions with key stakeholders (interdependencies), business planning processes, user groups, WRMP processes, production planning plus many more. All of these processes are outlined throughout this report and allow SEW to assimilate the latest data and information for use throughout our business functions.
	8.3 Reporting Authority makes clear provision for monitoring thresholds, above which climate change impacts will pose a risk to the organisation, and their incorporation into future risk assessments.	Indicates plan to monitor climate change thresholds and availability of climate change projections for the inclusion in future risk assessments.	The latest UKCP09 climate projections have been used within the WRMP14. Future WRMPs will utilise the latest climate projections available. Many risks require assessments on a case by case basis; however, where possible assessments have been made of the impacts climate change will have on each business function. These assessments have also been carried out using the latest UKCP data available.

Complete	1.2 Reporting Authority presents a clear analysis of climate risks on business operations for specified periods into the future and includes high priority climate related risks and timescales.	Formal analysis of climate change risks within a business risk matrix.	The methodology used to analyse climate risks has been improved upon as outlined in Section 4.4 of this report.
	5.2 Reporting Authority's adaptation plan includes a detailed action plan covering its priority areas. This should ideally include timescales, resources and responsibilities and be included in the report.	Adaptation action plan includes timescales, resources and/or general responsibilities.	The Adaptation matrix has been updated.
	5.4 Reporting Authority's adaptation plan is subject to appraisal against sustainability principles, and specifically to an appraisal of costs and benefits.	Qualitative appraisal of economic, social and environmental benefits.	Sustainability and cost/benefit analysis have been reviewed for each adaptation option, although much remains identical to the analysis carried out in the first round report.
	7.2 Reporting Authority's adaptation plan includes a statement of the barriers to implementation and a means for overcoming these.	Barriers to implementation are identified and justified.	The barriers to implementation of adaptation options have been identified and assessed.
	8.2 Reporting Authority makes clear provision for the evaluation of the effectiveness and viability of its adaptation plan.	Summarises plan to evaluate adaptation plan.	The Adaptation matrix has been updated.
	8.4 Reporting Authority makes clear provision for the monitoring of residual risks from climate change on the organisation and its stakeholders.	Summarises plan for continued assessment of climate change risks.	Mitigated risk targets have been formally assessed via the methods outlined in Section 4.4 of this report. We have outlined how adaptation options aim to reduce risk impacts incurred by the company. Climate change risks are deeply embedded within our business processes. Climate change risks are assessed and reviewed on a regular basis as outlined in Section 4 of this report.

Complete and fully integrated	1.1 Climate change demonstrably a key consideration in corporate planning and processes of the Reporting Authority.	Strategic analysis of climate change risks alongside other business risks and consideration of resource requirements to manage priority risks.	As first round report.
	1.3 Adaptation plan is clearly embedded in the core of the Reporting Authority's business.	Clear structured plan for continued assessment of climate change risks, and/or integrated adaptation plan with risk management actions prioritised, resourced and actioned.	As first round report. Section 4 of this report outlines how we have further embedded climate change risks into our business functions via internal processes.
	1.4 Reporting Authority includes some prior evaluation of how its climate change risks impact upon or are affected by stakeholders.	Active engagement with key relevant stakeholders in the assessment and management of prioritised climate change risks.	As first round report. We have outlined key interdependencies for the successful implementation of adaptation options. Section 8.1 of this report describes these interdependencies and our interactions with them in greater detail.
	1.5 Reporting Authority considers the existing policies and procedures related to climate impacts, and the effect the weather has on operations and the achievement of the organisation's strategic objectives.	Evidence that business is mindful of the impact of climate change and the weather, and there is evidence of active, ongoing consideration of their influence and impact on business decisions.	As first round report. Section 4 of this report outlines how we have further embedded climate change risks into our business functions via internal processes.
	2.1 Reporting Authority adopts a conceptual risk management framework for organisational, rather than locational risks.	Evidence for the identification of key drivers of climate change risk within the organisation, of an adaptation plan and forward risk assessment programme that addresses these key features.	As first round report.
	3.1 Reporting Authority adopts the latest set of UK Climate Projections (currently UKCP09) or other appropriate scenarios or climate information.	Full and appropriate use of climate information with justification and demonstrable understanding of implications over the choice of scenarios for the risk assessment.	As first round report. WRMP14 utilises the most current climate change projections and provides an update to the WRMP09 used in the first round report.
	3.2 Reporting Authority demonstrably assesses using the best evidence suitable to organisational need.	Discusses the selection of supporting evidence used in the risk assessment by reference to organisational context, identifying where risks are particularly sensitive to the selection of specific lines of evidence.	As first round report.
	5.1 Reporting Authority provides priority areas for action that are demonstrably linked to the development of a risk-based adaptation plan.	Adaptation plan is targeted towards the key features of the priority risks.	As first round report. The Adaptation matrix has been updated.
	8.1 Where possible, the Reporting Authority's report shows progress already made against its adaptation plan.	Evidence for a reduction in organisational exposure to climate change risks by reference to active implementation of adaptation plans.	As first round report. The Adaptation matrix has been updated.

Figure 2: Radar chart of key attribute performance⁸



⁸ Cranfield University. March 2011. Evaluating the Risk Assessment of Adaptation Reports under the Adaptation Reporting Power, Cranfield University, Cranfield, 18pp.

3. Requirements for voluntary second round reporting

In July 2013, under the Climate Change Act 2008, Defra laid before Parliament a report entitled '2013 Strategy for exercising the Adaptation Reporting Power and list of priority reporting authorities'.

The strategy sets out how government proposes to use its Adaptation Reporting Power moving forward. The Strategy sets out that a voluntary approach to reporting will be implemented for the second round instead of issuing a statutory direction. This reflects the overwhelming support for a voluntary approach during consultation, and will ensure reporting is flexible and responsive to the needs and circumstances of the different sectors, while minimising burdens.

Reporting will help the government understand the level of capacity to adapt in the sector. The information provided will also importantly inform the next Climate Change Risk Assessment which will be published in 2017 and the update of the National Adaptation Programme (NAP) thereafter.

The purpose of the second round of reporting is to provide an understanding of adaptation planning, and the extent to which adaptation actions are being considered and implemented. This will feed into the next NAP. This report will also help the government to assess the impact that the voluntary reporting process has to support organisations build their climate resilience.

We have welcomed the request made by Defra to feedback progress we have made and report on our further monitoring and understanding of climate change risk and adaptation.

This report follows the guidance set out by Defra to us in December 2013, and we have taken the opportunity to combine that request with addressing areas for improvement we received in feedback from their first round of reporting in 2011.

The first and second round direction letter from Defra can be found in Appendix A and Appendix B.

Included with the second round direction letter was a reporting template issued to organisations, like us that have previously compiled a report on adaptation to climate change. We have adopted the headings in this template to complete this second round report. We answer each question raised in the template under a subheading within the report.

This version of the report has been adapted for public consumption as the original full report contains commercially sensitive information.

4. Understanding climate risk

4.1. How has your understanding of climate risks, impacts and their effects on your sector/organisation and stakeholders advanced since your first round report?

There have been four notable areas of development that have occurred since we submitted our first round report that have contributed to advancing on our first round report:

1. Embedding and quantifying climate change into our routine management and monitoring of risks

We have completed a comprehensive review of the way we assess and monitor all types of risks affecting our business, including risks associated with climate change.

The review has included implementing a risk monitoring software tool to identify, assign and quantify function level risk registers that allow pre and post mitigation assessments of risk, and the monitoring of action plans. These are reviewed monthly and presented before the board of directors once per annum.

The process by which our risks are currently monitored and assessed (including the method by which risks are scored) will be explained in greater detail within Section 4.4.

2. Updated assessment of climate change impacts on water supply and demand

In the first round report we made an assessment of UKCP09, and committed to quantifying impacts of climate change when we updated our future supply and demand forecast as part of Water Resources Management Plan 2014 (WRMP14), published in June 2014. The full assessments can be found on our website⁹ and cover the period 2015-2040. A summary of the approach and outcomes can be found in Section 4.2.

⁹ <http://www.southeastwater.co.uk/about-us/our-plans/water-resources-management-plan/wrmp-library>

3. Greater collaborative long term planning and understanding of regional impacts

We have worked closely with local planning authorities to develop a robust understanding of population and property forecasts to use in our assessments of climate change impacts on supply and demand under UKCP09; to explore adaptive measures such as raising awareness and promoting efficient use of water.

We successfully completed collaborative modelling work with the WRSE group to assess 'in combination' regional impacts of climate change on our respective supply and demand forecasts using UKCP09, and then to explore the resilience and adaptive capacity of different regional strategies and solutions. The outcome from the WRSE work was adopted directly into our WRMP14 final strategy.

4. Experience of recent winter storms and floods

During the severe winter storms of 2013, we were able to quantify and validate the level of resilience and adaptive capacity that our current infrastructure provided under a series of intense rainfall events and prolonged wet weather that was comparable with a 1 in 200 year level of severity. This has led to a better understanding of surface water and groundwater flooding in close proximity to our assets and quantification of potential water quality issues that were built into our future plans.

Our experience during the winter of 2013 confirmed, that our existing infrastructure provided a suitable degree of resilience to 1 in 200 year wet weather conditions, following significant investment we have made in flood protection of our assets during the period 2010 to 2015.¹⁰

However, the 2013 winter storms did identify a greater level of vulnerability of our supply infrastructure to power outages than had previously been thought. While these outages only affected a very small number of customers and for a relatively short period of time, it did lead us to improve facilities at a number of sites for alternative / reserve power supplies. We now have in place more robust infrastructure to allow emergency generator power to be brought on line at short notice at any time, a prime example of adaptive measures in practice. This event also flagged the importance of our interdependency with power suppliers. Since these events, our relationship with our energy suppliers has developed further and a greater level of resilience has been built into our emergency plans (e.g. the identification of key strategic sites).

¹⁰ £3.6 million was spent in AMP5 on flood risk mitigation projects at South East Water boreholes and treatment works.

4.2. What climate change evidence or research have you used to better understand the implications for organisational functions?

In the first round of reporting we based our assessments upon the latest UK climate change projections (UKCP09). Therefore, all information on climate change in the South East as detailed in the first round report from 2011 is still relevant.

Prior to our first round report, our long term water resource management supply and demand forecast planning assumptions were based upon UKCP02.

The latest update to our long term Water Resources Management Plan (WRMP14), published in June 2014 was based on improved climate change data using UKCP09. We commissioned specialist HR Wallingford to complete a vulnerability assessment for our existing water supplies areas; to assess the impacts of climate change to our future supply and demand forecast, and assess the sensitivity to climate change of future supply options.

All assessments completed by HR Wallingford were included in Appendix 3D of the WRMP14¹¹.

The updated assessment of impacts to our supply forecast concluded that the range of uncertainty made in our previous plan (WRMP09) remained reasonable using the latest information, although the projected impacts themselves are marginally lower than those reported previously (for WRMP09). However, the assessments also highlighted greater variability of events that could have a greater impact on our ability to maintain supplies under the most extreme events. This as an area for further work that we are undertaking to improve our longer term resilience and adaptive capacity.

The latest assessments of climate change for medium or high vulnerability supply areas were completed by:

- Reviewing the latest research including the UK Government's Future Flows project¹²;
- Using our HYSIM rainfall-runoff models and a set of 17 groundwater models;
- Applying one hundred UKCP09 projections to the relevant hydrological or groundwater models;
- Selecting 20 of these projections for application to water resources systems models for water resource zones 2 and 3¹³, which were projected to see the greatest impacts.

¹¹ HR Wallingford. August 2012. South East Water: Climate change studies to support the draft Water Resources Management Plan Task 2: Impacts of climate change on Deployable Output - Summary Report, HR Wallingford, Wallingford.

¹² <http://www.bgs.ac.uk/research/groundwater/change/FutureFlows/home.html>.

¹³ See Figure 1: Map of South East Water's company boundaries' for location of water resource zones.

WRMP14 Appendix 7F comprises the review of potential climate change impacts on our feasible options list. This report was prepared by HR Wallingford in September 2012¹⁴.

A number of sensitivity tests were completed for our WRMP14 on key assumptions in the plan. In particular to explore the impact of differing assumptions on the final demand forecast, impact of climate change, different levels of service and various levels of risk assumptions in the assessment of planning uncertainty (target headroom).

Analysis of the projected climates for UKCP09 Thames and South East England river basins, and Stour Future Flows climatology, suggests changes in temperature, potential evapo-transpiration (PET) and rainfall for dry, mid and wet scenarios for South East Water is shown in Table 3.

Table 3: Summary of climate projections¹⁵

Variable	Scenario	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temp change °C	Dry	1.2	0.5	2.0	0.8	0.9	1.9	2.4	2.1	1.6	3.4	2.7	2.7
	Mid	1.6	2.3	1.6	2.1	0.4	2.8	2.9	1.1	0.8	1.3	2.5	2.1
	Wet	3.1	3.1	2.7	1.9	1.5	2.2	2.0	1.5	1.5	1.8	2.5	4.3
PET % change	Dry	46.0	15.6	31.4	33.1	22.7	19.3	29.2	57.3	49.2	21.0	54.8	47.7
	Mid	32.0	38.2	26.1	23.7	36.1	48.4	55.6	55.8	48.3	48.8	46.3	46.9
	Wet	45.8	29.0	25.5	44.7	31.8	30.4	29.5	38.9	48.7	47.8	55.7	34.1
Rainfall % change	Dry	-11.3	-5.3	-22.4	-2.2	3.5	-20.4	-19.4	-36.0	-27.8	12.1	-6.1	23.5
	Mid	27.1	36.6	3.0	11.1	-7.3	3.4	-41.5	-17.1	2.1	-4.3	-16.1	24.4
	Wet	48.7	58.1	23.1	-4.9	-9.5	-8.5	-13.8	22.4	6.8	-2.6	28.4	32.8

Using the data from the above table as the thresholds for our source deployable output (DO) modelling, the following impacts on South East Water DO were assessed:

- The 'dry' scenario shows significant impacts over all resource zones, although zone 7 is substantially less affected than the others in terms of million litres per day (Ml/d) DO loss.
- The 'mid' scenario gives significant reductions in zone 2 and to a lesser extent zone 8. Zones 1, 4, 5 and 7 are relatively unaffected by climate change for the 'mid' scenario.
- The 'wet' scenario shows significant increases in DO only in zones 2 and 3.

These results are represented in greater detail by Table 4.

¹⁴ HR Wallingford. September 2012. South East Water: Climate change studies to support the draft Water Resources Management Plan – Review of potential climate change impacts on South East Water’s feasible options list, Report TN MAR4966-04 R1, HR Wallingford, Wallingford.

¹⁵ HR Wallingford. September 2012. South East Water: Climate change studies to support the draft Water Resources Management Plan – Review of potential climate change impacts on South East Water’s feasible options list, HR Wallingford, Wallingford, 4pp.

Table 4: Summary of climate change DO (MI/d) losses/gains for 2035¹⁶

Resource Zone	Peak (dry)	Peak (mid)	Peak (wet)	Ave (dry)	Ave (mid)	Ave (max)
1	-4.37	-0.05	0.00	-2.92	-0.04	0.00
2	-17.46	-5.45	5.83	-17.68	-6.09	5.83
3	-7.77	-1.30	1.00	-7.80	-1.64	1.00
4	-9.15	-0.06	0.00	-9.09	-0.05	0.00
5	-6.14	0.00	0.00	-5.11	-0.01	0.00
6	-3.82	-0.65	0.00	-4.72	-1.92	0.00
7	-3.21	0.00	0.00	-2.22	0.00	0.00
8	-5.74	-0.98	0.00	-7.08	-2.88	0.00
Total	-57.65	-8.49	6.83	-56.62	-12.63	6.83
%	-7.9%	-1.2%	0.9%	-9.1%	-2.0%	1.1%
	% of average day DO as reported in WRMP14 at 2015 (622.7MI/d)			% of peak summer day DO as reported in WRMP14 at 2015 (727.2MI/d)		

4.3. Has your understanding of thresholds of climate impacts advanced to better pinpoint organisational vulnerability? If so, how?

Since the last round of reporting in 2011, we have applied our own and industry-wide research into climate change impacts to provide greater levels of detail on risk that was lacking on the sensitivity of certain receptors to climate variables; this in turn has enabled us to identify reasonable thresholds above which we believe receptor sensitivity changes.

The first round report on adaptation to climate change we produced in 2011, in many instances, had not calculated particular thresholds due to these requiring very specific quantitative assessments. The work completed since and summarised in this second round report addresses the majority of these instances.

We have developed quantitative analysis of risks, to underpin the decision making employed to support a number of areas in our latest business plan (PR14) covering the period 2015 to 2020. The sensitivity and thresholds we have identified have been used to assist in determining target outcomes for mitigating projects to achieve once completed.

Sensitivity and threshold analysis have also assisted in the risk scoring process as well as improving our understanding of the degree of vulnerability and exposure certain risks present to our activities under differing levels of climate variability. We have provided more information in Section 4.4 of this report.

¹⁶HR Wallingford. August 2012. South East Water: Climate change studies to support the draft Water Resources Management Plan – Task 2: Impacts of climate change on Deployable Output - Summary Report, HR Wallingford, Wallingford, 13pp.

4.4. How have you developed your quantified assessment and analysis of risk likelihood and impacts?

The previous round of reporting on adaptation to climate change carried out in 2011 required us to prioritise adaptation action towards significant impacts, with reference to the approach advocated in Defra's guidance, each climate risk was assigned a qualitative risk indicator of 'Low', 'Medium', 'Medium-High' or 'High'.

This was a qualitative assessment, but was based on explicit assessment of components of vulnerability and on other evidence included in the aforementioned impacts matrix, supported by a risk scoring exercise undertaken by our team.

Since the first round report, this methodology of assessing risk scores has been significantly improved upon. Risks are now assessed across a range of different categories, namely; financial, health and safety, public relations, regulatory, operations, assets, legal, information technology and other (including scheduling, environmental etc.). Each risk is assigned scores across these categories via the guidance contained in Table 5.

Quantification of climate change risks is undertaken by specific departments of our organisation, largely in response to regulatory requirements, such as the Water Resources Management Plan.

We have used analysis carried out for other business processes to inform the risk assessments in this report; separate quantitative assessments have not been considered necessary for the second round of the adaptation reporting purposes. We believe this approach has enabled us to quantify the risk to a better extent in light of the latest information available.

Table 5: Risk impact categories

Descriptor	Insignificant	Minor	Moderate	Major	Catastrophic
Financial	<£100k of budget or revenue.	£100k-£500k of budget or revenue.	£500k-£1m of budget or revenue.	£1m-£5m of budget or revenue.	>£5m of budget or revenue.
Schedule	Little or no delay.	Increases duration by >2.5%.	Increases duration by >10%.	Increases duration by >25%.	Increases duration by >100%.
Safety	No injuries.	First aid treatment /out-patients.	Several injuries /hospitalisation.	Extensive injuries /hospitalisation.	Fatality / significant irreversible effects to several people.
PR / Profile	Some complaints but project, client, stakeholder reputation intact.	Adverse local publicity or media attention.	Attention from media and/or significant concern by local community /criticism by NGOs.	Significant adverse regional and State media coverage / community and NGO outcry.	Serious adverse international and/or national coverage / community and NGO outrage.
Regulatory Relationships	Initial irritation but no formal complaints, subsequently resolved.	Resolved at working level.	Resolved at senior management level.	Legal recourse or Directorate intervention.	Government level intervention.
Build Quality	Cosmetic repairs / rectification.	Minor repairs / rectification.	Major repairs / rectification - including structural.	Substantial re-build.	Total replacement.
Operational	Negligible impact /no significant impact on personnel.	Minor change to operations / some inconvenience to personnel.	Requires a change in operations, work routines and schedules.	Major disruption to operations, work routines and practices - additional resources may be required.	Operations not possible or facility closed /impact on the well-being of personnel.
Environment	No effects or effects which are below levels of perception.	These effects may be raised as local issues.	Important considerations at a local level.	Important considerations at a local or regional scale.	Associated with sites and features of national or state importance.
Property / Assets	Negligible damage to or loss of assets.	Minor damage to or loss of assets - some repairs may be required.	Moderate to high damage to or loss of assets - requires specialist /contract equipment to repair or replace.	Significant and /or permanent damage to assets and/or infrastructure.	Widespread, substantial and /or permanent damage to assets and/ or infrastructure.
Social / Cultural Heritage	Negligible social or cultural impacts.	Minor medium term social impacts on local population.	On-going social issues /permanent damage to structures or items of cultural significance.	On-going, serious social impacts /significant damage to structures or items of cultural significance.	Widespread, on-going, significant serious, irreversible social impacts.
Legal	Some minor non-compliances and breaches of regulation.	Minor legal issues, non-compliances and breaches of regulation with option for legal recourse.	Serious breach of regulation with investigation or report to authority with prosecution and /or moderate fines possible.	Major breach of regulation /major litigation.	Significant prosecution and fines /very serious litigation including class actions.
Systems, Information and Data	Negligible loss of or damage to IT and communications.	Minor loss of /damage to IT and communications.	Moderate to high loss /damage to IT and communications.	Major loss /damage to IT and communications.	Extensive loss /damage to IT and communications assets and infrastructure.

Each individual risk throughout the company has been assigned a probability of occurrence. The guidelines by which these probabilities are assigned are represented by Figure 3.

Figure 3: Likelihood (probability) guidance for risk assessment

Likelihood (Probability) Guidance		
5	ALMOST CERTAIN	Greater than 90% chance of occurring.
4	PROBABLE	Between 60% and 90% chance of occurrence.
3	POSSIBLE	Between 30 and 60% chance of occurrence.
2	UNLIKELY	Between 10% and 30% chance of occurrence.
1	REMOTE	Less than 10% chance of occurrence.

A combination of both the risk scores and assigned probabilities are then used to assign an overall risk score. The methodology used is to take into account both the probability assigned to the specific risk, as well as the highest level of impact incurred across all of the impact areas for that risk. This is then attributed an overall risk score via the heat map as shown in Figure 4. Risks are scored from 1 (low) to 25 (high). Risks are classified as falling into green, amber or red categories. Green risks are those risks classified with a risk score from 1-6, amber as those risks classified with a risk score from 7-16 and red risks are those risks classified with a risk score from 17-25. As an example, if the likelihood of a risk occurring is 'probable' and has an insignificant financial risk, a moderate risk to assets and a major legal risk, the risk will be aggregately scored as 20 (a significant red risk).

Figure 4: Risk score heat map

HEAT MAP						
		Impact				
		1. INSIGNIFICANT	2. MINOR	3. MODERATE	4. MAJOR	5. CATASTROPHIC
Likelihood	5. ALMOST CERTAIN	8	15	22	24	25
	4. PROBABLE	7	14	19	20	23
	3. POSSIBLE	5	9	16	18	21
	2. UNLIKELY	3	4	10	13	17
	1. REMOTE	1	2	6	11	12

Every risk held within our risk register has an assigned control rating. Here, the business controls that are in place for each specific risk are listed. The combination of these business controls are then assessed and allocated a control effectiveness score from 1 (awareness) to 5 (optimised). The methodology behind assigning control effectiveness scores is shown in Figure 5.

Figure 5: Control rating guidance

Control Rating		
1	AWARENESS	Business is aware of a need for control process, but not formal process is in place. Ad Hoc management
2	REPEATABLE	Minimum control process in place within the department, but it is repeatable across the department. Little consistency between departments
3	DEFINED	Centrally controlled process in place across entire business. Senior management consistently engaged
4	MANAGED	Routine use of metrics and quantitative methods to measure the performance and quality of the control. Top management are committed to seek out innovative ways to achieve goals
5	OPTIMISED	Control is fully embedded in day to day business. Native controls are flexible and adaptive to changing requirements. Risk and Controls are seen as part of the businesses continuous improvement process.

The risk assessment methodology mentioned above has been used to develop the risk impacts matrix for climate change risks. This matrix also includes information from the first round of adaptation reporting. Therefore, the information included in the updated impacts matrix to support the assessment of significant impacts includes:

- The business function to which the impact relates;
- The relevant climate variable(s);
- A description of the impact;
- Sensitivity of the business function/receptor to change in climate variables;
- The distribution of the risk (spatial and/or temporal);
- Changes in exposure from changes in the relevant climate variable(s);
- Probability of the risk occurring;
- Risk score analysis across different areas (i.e. financial, assets, legal etc.);
- Overall risk score;
- Current business controls in place;
- Control effectiveness score, and
- Whether an assessment of the risk has been undertaken.

Levels of confidence have then been assigned to risks on the basis of the pedigree of the evidence used to identify them. Therefore, a quantitative analysis by South East Water is afforded the highest level (A), and levels of decreasing pedigree are assigned for qualitative company study (B), quantitative industry-wide study (C), qualitative industry-wide study (D), and finally, dialogue with South East Water employees (E).

The 'Overall Risk' category described above was used to prioritise risks to carry through for adaptation action in this report. Priority risks can be considered as those which are considered to result in the most significant impact on South East Water or our stakeholders, and/or those which require immediate practical action or investigation.

For the first round report, workshops with specialists from across the company were used as an opportunity to identify the most pressing risks to our operations, customers, environment and stakeholders. Since these workshops, the development of risk management culture within our company has led to risks and their mitigating actions being reviewed on a regular basis. This includes any increase/ decrease in risk scores across all categories as well as continued analysis of the likelihood of risks occurring.

During the previous round of reporting, those impacts that were considered to pose a Medium-High or High risk were taken forward to the next stage. As assessments are now undertaken using a quantitative methodology, those risks that were assessed to have an overall risk score of 17-25 (significant red risks) have been taken forward to the next stage. Actions relating to risks scored below 17 will be held within the company risk register and monitored accordingly.

5. Details of risks: risks carried forward from first round report and new risks identified by the second round report

Table 6 outlines the risks that have been carried forward from the previous round of reporting in 2011. These have since been reviewed which led to departmental responsibilities being assigned in order to align them more clearly with our company level risk register.

Table 6: Summary of risks carried forward from the last round of reporting

Climate change impact	Description
Water Resources	
Reduction in surface water availability	Reductions in rainfall, particularly during consecutive seasons, with corresponding increases in year-round PET can reduce reservoir refill capability. Winter recharge is likely to increase, though how changes in inter-annual variability are more uncertain.
Increased competition for shared water resources	The Water Resources in the South East (WRSE) Group, driven by the EA, may require companies to work more closely in managing shared resources, e.g. the River Medway Scheme and Southern Water. Greater numbers of sustainability reductions may also be imposed. Climate change is likely to emphasise a much more integrated strategy across the region.
Risk of non-renewal of time limited licences or existing licences being modified	SEW operates in a water stressed area so there is already increasing scrutiny and risk to existing abstraction licences. This is likely to increase with a change in climate due to changes in hydrology. Increases in evapotranspiration and lower rainfall in summer periods will result in lower flows in rivers. Increases in rainfall intensity may result in flashier river flows, reducing the period of time available to exploit peak flows. Licences may need to be altered to maintain the balance between environmental needs and public water supply. Time limited licenses have ceased and licenses have been updated and modernised. The method by which abstraction licenses are drawn up is currently being reviewed Defra which includes the consideration of the impact climate change has upon licenses, improving our ability to adapt and therefore minimising SEW's exposure to climate change risk.
Increasing demand in warmer weather	Warmer weather likely to result from climate change is likely to result in increased demand for water, in particular with respect to personal hygiene, washing, domestic garden watering and other external uses of water.
Reduction in groundwater availability	Reductions in rainfall, particularly during consecutive seasons, will reduce the amount of winter recharge that occurs at groundwater sites, hence decreasing the availability of groundwater resources to meet demand.

Asset management	
Increase in risk of fluvial flooding	Increased frequency of extreme rainfall events will heighten the risk of river levels rising and causing fluvial flooding of water company assets.
Increase in risk of groundwater flooding	Increased frequency of extreme rainfall events will heighten the risk of groundwater levels rising and causing flooding of both underground and above-ground water company assets. Flooding of service trenches will also inhibit the ability of SEW to repair leaks.
Increase in risk of surface water flooding	Increased frequency of extreme rainfall events will heighten the risk of surface water flooding of water company assets, particularly in areas where SUDS are not present. Flooding will also reduce the mobility of SEW staff to access sites and detect and repair leaks in inundated areas. Risk of flooding exacerbated where development results in permeable surfaces are replaced with paved areas within catchments.
Increase in risk of tidal/coastal flooding	Sea level rise may expose SEW assets to both erosion and flooding with saline water. Impacts will clearly be greater at coastal sites, but those situated on estuaries will also be vulnerable. Consideration of the risk of tidal flooding may also limit the favourability of particular resource options, e.g. desalination plants, in future options appraisals.
Risk to dam safety	This impact relates to the capacity of dam spillways to deal with high volumes of water from extreme rainfall events that could lead to dam overtopping and erosion of the embankment materials, leading to dam failure. The structural stability and therefore safety of dams is also vulnerable to extended periods of low rainfall, fluctuations in water level and extremes of temperature. The results of these climatic impacts, respectively, include desiccation of clay cores, increases in pore pressure leading to erosion, and thermal cracking.
Risk to structural stability of dams	Soil conditions may exhibit increasing variability as a result of changes in inter-annual temperature and rainfall regimes, which may affect slope and structural stability, as described above.
Increases in Leakage / Burst Frequency	While low temperature extremes and snowfall are predicted to decrease – and thus reducing the risk of burst frequencies and leakage through freeze-thaw weathering, reducing soil moisture in dry spells will increase the risk of heave and associated damage to pipes.
Variable water quality affecting treatment processes	Greater variability in water quality as a result of both variable dilution potential associated with flow extremes and differing pollutants in raw water from altered land practices, may affect the efficacy of water treatment processes. Single-stage treatment processes will be particularly vulnerable to this.
Increase in outages from bad weather affecting assets and power supply	The frequency of outage events resulting from both extreme rainfall and low flow is likely to increase with climate change. Outages from more persistent environmental change and cumulative effects of causal factors can also lead to an increase in outage frequency. An increase in outage will impact SEW's supply-demand balance and the operation of sites. This may also impact upon SEW's DG3 'interruptions to supply' reporting, which is considered by the economic regulator, Ofwat.
Water quality	
Saline intrusion	Rising sea levels may cause salinity of groundwater sources, thus making them inoperable, sometimes permanently. This impact is more likely to affect sources at/near the coast.
Risk of aquifer contamination from flooding	Extreme rainfall events and associated increases in groundwater flooding may result in conveyance of pollutants through groundwater into aquifers. Existing groundwater source treatment processes may become inadequate.
Increased land runoff	Increased surface runoff, identified above as being a direct result of extreme rainfall events, will provide increasing capacity for agricultural fertilisers, pesticides, herbicides and nutrients to be conveyed to river channels and thus affecting quality of sources of raw water. Additional risk of N & P pollution.
Reduction in water volumes and pollution dilution	Multi-season low rainfall and associated low flows in rivers, reservoirs and aquifers, would result in lower dilution potential for pollutants - particularly sewage - and consequently higher raw water concentrations entering treatment works.
Increased algae risk in reservoirs	Lower summer flows, higher temperatures and increased solar incidence are likely to increase the risk of larger and more frequent algal blooms in reservoirs. This will heighten the need for treatment, thus increasing OPEX and potentially necessitating a capital solution.
Increased risk of cryptosporidium in reservoirs	Higher demands as a result of increased temperatures and lower summer rainfall will mean reservoirs are drawn down more rapidly. Low residence times can increase the risk of cryptosporidium in reservoirs, thus putting sources at risk.
Increased risk of turbidity	Extreme rainfall events can result in flashy river flow regimes. This in turn leads to greater disturbance of benthic sediment which, along with greater sediment conveyance from surface runoff, can cause increased turbidity risks at water treatment works. High turbidity levels often result in auto-shutdown of treatment works, thus impacting supply.
Increasing nitrates / mobilisation of fines	Extreme rainfall events (particularly after dry periods) will result in the mobilisation of large quantities of fine sediment. This will result in a heightened risk of siltation at intake structures and increased mobility into raw water of bound nutrients, potentially impacting treatment efficacy. Additional risk of N & P pollution.
Reduced dissolved oxygen in surface waters	Higher temperatures and/or reduced flows may cause a reduction in dissolved oxygen in surface waters; increasing the need for further treatment because of the reduced ability of receiving waters to cope with pollution.

Energy & carbon	
Increasing energy demand in warmer/drier weather	Demand for water increases in warm, dry weather, which increases treatment and pumping requirements and hence energy use. This has both financial and carbon implications.
Biodiversity & conservation	
Increasingly difficult management and improvement of conservation areas (e.g. SSSIs)	A changing climate is likely to alter the condition of conservation areas, thus management and preservation of baseline conditions will become increasingly difficult; a particular case would be the chalk grasslands habitat diminishing or disappearing.
Potential difficulty in meeting WFD standards	Climate change may make it more difficult to meet the new WFD standards for all water bodies to be in 'good' ecological condition.
Potential changes to abstraction licences to protect SSSIs and wetlands	Licensing conditions for abstractions may become stricter in order to protect European designated wetlands in supply areas.
Decrease in base flows in rivers	A decrease in river summer base flow may result in the need for alterations in the operation of reservoirs to supply rivers with compensation flow (to maintain good ecological status in the basin).
Potential risk of spread of disease in trees in SEW landholdings	Potential increase in spread of major tree diseases as a result of climate change. Potential liability for trees on SEW landholdings.
Potential public health impact of algal blooms in reservoirs used for recreation	Algal blooms in reservoirs may result in safety and public health problems, and potential for claims against SEW because of ill health.
Increased risk of sedimentation/siltation	Extreme rainfall events will cause increased runoff rates and increased sediment mobility, resulting in increased conveyance of fine sediment and also large sediment into reservoirs and rivers, causing siltation.
Organisational capacity	
Lack of staff awareness of climate change and associated impacts and adaptation options	The impact of climate change on operations is likely to impact all SEW staff in some way in the future, e.g. in operation of sites, access to sites or responding to customer enquiries or complaints.
Higher numbers of customer complaints arising from greater frequencies of extreme events	Greater frequencies of extreme events, such as heatwaves causing greater frequencies of demand restrictions, and flooding causing disruptions to supply, will result in higher numbers and different types of customer enquiries or complaints. Customers will expect SEW to take all actions such that predicted climate change is planned for. This may in turn impact upon SEW's performance against Ofwat's Service Incentive Mechanism and other comparative assessments.
Operations	
Maintenance access difficulties in bad weather	Access to SEW sites for operations staff and delivery vehicles or the ability to operate leak detection and repair services may be inhibited by extreme rainfall and flooding.
Increased risk of loss of service from suppliers - e.g. electricity, chemical suppliers, etc.	SEW may be affected where suppliers cannot deliver a service on which SEW relies, such as power, supply-chain requirements (e.g. chemicals) and personnel/contractors.
Finance & investment	
Reduced financial rating of UK water companies	Climate change and the vulnerability of companies to its effects may become a measure by which companies' credit ratings are assessed and which may affect investor confidence and in turn the cost of capital. This impact is likely to be low for SEW as a regulated company.
Greater OPEX reflecting additional impacts of climate change	Higher operational costs as a result of the impacts listed within this table.
Regulation	
Vulnerability to political stances on climate change	Changes to political stances in relation to climate change may impact upon SEW if increased scrutiny of adaptation efforts arises which could potentially impact upon the Company's reputation. It may also require the Company to focus more on particular measures, e.g. metering. PR19 political stance change driven mainly by EA/ Defra/ DEC. Any policy changes would be funded via an increase in customer bills.
Facilities management	
Increased need for air conditioning in summer and heating in winter	Increased temperature variability may impact upon working conditions for SEW staff, both in offices and vehicles.

Table 7 outlines the risks that have been newly identified since the previous round of reporting in 2011.

Table 7: Summary of risks identified by South East Water since the last round of reporting

Climate change impact	Description
Biodiversity & conservation	
Spread of non-indigenous species	The movement of water between different basins causes the spread of non-indigenous species, for example; zebra mussels. Such species can cause a wide range of problems, for example; causing the blocking of pipes.
Facilities management	
Increase in taxation and charges upon environmentally unfriendly vehicles	Increases in air pollution and smog due to higher temperatures could lead to governments and local councils introducing higher charges or taxes (e.g. congestion charge) for vehicles, in particular those which are older and less environmentally friendly. Recently however, nitrogen dioxide (most of which is produced by diesel vehicles) has also been focussed upon due to increased levels being recorded in the UK's major towns and cities.
Increased road network disruptions	Increased road disruption due to traffic accidents caused by bad weather can cause severe disruptions to the activities of SEW and contracted employees. This will cause disruption as well as incurring a loss of man hours and fuel whilst idling in traffic.
Increased risk of damage to SEW buildings	An increase in extreme weather events could cause higher levels of damage to SEW buildings, incurring an increased level of maintenance costs.
Health & safety	
Sun burn, fatigue and heat exhaustion	Increases in mean temperature and/or solar incidence could lead to an increase in incidences of sun burn and fatigue/heat exhaustion to SEW employees, possible resulting in hospitalisation and/or man hours lost.

6. Understanding uncertainties

6.1. What uncertainties remain in monitoring and evaluating climate risks to your sector's/organisation's functions?

Uncertainty is inherent in climate change assessments, and through probabilistic projections from UKCP09 they are now a feature of the climate data available in the UK. Our latest assessments use the data from UKCP09 where plausible, as was the case in the WRMP14. Where this data has been used, the uncertainty has been quantified by taking 'Mid', 'Wet' and 'Dry' scenarios or models to represent the spread in the projections.

In accordance with the guidelines for producing the WRMP14, our assessment of climate change has been completed in two parts: the first is a vulnerability assessment to identify which of our sources and water resource zones are most sensitive and at risk to different climate change scenarios; then, having identified those sources, our second approach is to complete more detailed modelling to understand what levels of reductions in water availability we should forecast in our WRMP14.

Our assessment of future climate change scenarios covered a wide range of outcomes. As required by the water resources planning guidelines, we have included the central case in our baseline and incorporated the high and low ranges into the uncertainty component (target headroom) of the WRMP14.

As well as reductions being applied to our existing sources, climate change impacts are included in our demand forecasting assumptions, and have also been considered when looking at new options to meet future water demand during the life of WRMP14.

Due to the nature of the impacts climate change will have upon the water sector, all uncertainties identified in the previous round of reporting in 2011 still stand. However, where possible we have carried out additional assessments on the relationship between our activities and climate variables, these, coupled with experience gained with severe weather events since the last round of reporting in 2011 has led to an increased understanding of these relationships, however, uncertainty in some areas still remains.

6.2. What new uncertainties have come to light?

No new uncertainties have come to light since the last round of reporting in 2011.

6.3. What further implications do uncertainties have on actions your sector/organisation has taken or plans to take?

Uncertainty is included in the assessment of adaptation options, as part of the identification of barriers to successful implementation and also with regard to potential regret. For example, if there is uncertainty with regard to the suitability or likely success of an adaptation option, it is more likely to be classed as medium or high potential regret. Potential regret must, however, be balanced against an assessment of the risk to our business and customers of doing nothing. This emphasises the potential benefit of using a threshold-based approach where possible, not based on climate per se but one that identifies the conditions under which particular tipping points may occur (e.g. impacts on treatment of drinking water or wastewater) and the risks they would impose on the business.

6.4. What progress have you made to address information gaps?

All information relevant to the climate change risks held within this report has been updated to reflect the information and findings included within the WRMP14, UKCP09, our own assessments and industry wide assessments. Many of the areas where information gaps were identified in the first round of reporting continue to exist due to the nature of the information gaps (e.g. having not experienced a significant and prolonged exposure to an increase of mean temperatures). Therefore the vast majority of these information gaps will be removed by continual review processes in place at South East Water. A single area where we have incorporated new information has been following the winter 2013 storms when new information was collected. In several instances where gaps have been identified, assumptions have been made, which have been tested to determine their appropriateness.

6.5. What are the strategic business and methodological assumptions that underpin your analysis of impacts and risks?

In evaluating climate risks company specific assessments have been used where available; based on industry wide approaches and evidence, and supported by UK Water Industry Research (UKWIR) and Environment Agency research and as directed by regulators. Where climate change analysis has not been undertaken by South East Water directly, evidence of risks is often taken from industry-wide studies. Therefore, there is an assumption that the methodologies from such research are robust and that the implications of impacts on our own activities can be reliably drawn.

Levels of confidence have been assigned to risks on the basis of the pedigree of the evidence used to identify them. Therefore, a quantitative analysis by South East Water is afforded the highest level (A), and levels of decreasing pedigree are assigned for qualitative company study (B), quantitative industry-wide study (C), qualitative industry-wide study (D), and finally, dialogue with South East Water employees (E).

For more information, see Section 4.4.

7. Details of actions: implemented and new

Table 8 contains a summary of all adaptation actions we have identified for risks assessed to have a risk score of 17 or above via the methodology set out in Section 4.4.

Table 8: Adaptation actions summary

Adaptation Option	Description	Adaptation Status
Reduction in surface water availability		
Develop conjunctive use schemes	Reducing groundwater abstraction during winter periods so as to maximise aquifer recharge, in conjunction with increased use of other available resources; balancing the use of resources within integrated resource systems.	Active (ongoing)
Increase reservoir capacity	This option is included as a measure to manage climate change impact alone. Constructing of strategic storage bodies to hold water, abstracted from rivers at potential locations in Kent and Sussex, during periods of high flow, for potable supply across the company as well as locally. Reservoirs schemes are more resilient to drought than direct river abstractions and, although their construction will have some immediate environmental effects, they can provide community and environmental benefits in the long term.	Active (ongoing)
New surface water abstraction	New surface water abstraction – from various rivers across the Company’s supply area.	Active (ongoing)
Desalination	Abstracting saline or brackish water from boreholes, estuaries or the sea and treating it to a potable standard using reverse osmosis technology.	Under consideration
International transfer	Importing raw water from abroad, using marine tankers or, for example, by towing icebergs.	Under consideration
National transfer	Importing raw water from other UK water companies using underground mains (which would require the construction of a national water grid or by conventional sea or road tankers).	Under consideration
Inter-company transfer	Importing treated water from neighbouring water companies. Several such arrangements are already in place across the region and the Company considered various options to augment or amend agreements that the Company has with its neighbours.	Active (ongoing)
Intra-company transfer	Improving internal connectivity around the Company’s distribution network by the construction of new mains and/or pumping stations.	Active (ongoing)
Reduce water lost through leakage	Further reducing leakage from the Company’s distribution system, through ‘find and fix’ programmes or pressure reduction measures.	Active (ongoing)
Maximising reservoir yield	Increase storage capacity of existing reservoirs through removal of silt and sediment, thus taking advantage of increasing winter rainfall without the need to build new reservoirs.	Active (ongoing)
Water re-use	Using effluent as a source of water and nutrients for crop and pasture applications. Effluent can be treated in settling pond/s before usually being applied through spraying.	Planned
Reduction in groundwater availability		
Develop conjunctive use schemes	Reducing groundwater abstraction during winter periods so as to maximise aquifer recharge, in conjunction with increased use of other available resources; balancing the use of resources within integrated resource systems.	Active (ongoing)
Artificial recharge	Recharging an aquifer with surface water through human effort, usually then recovered through wells. It requires a structure to keep surface water in a place where it can percolate down into the aquifer, or the means for direct injection. Useful during winter periods of high flow, for storage and later abstraction during summer periods.	Under consideration
Aquifer storage and recovery (ASR)	ASR is a specific form of artificial recharge, where potable water is placed specifically into an aquifer, usually through a well, and that same water is then abstracted (through the same well) at a later time, ideally without then requiring further treatment.	Under consideration
Relaxation of abstraction restrictions	More flexible abstraction licensing to take account of real-time catchment conditions.	Under consideration
New groundwater abstraction	Increasing groundwater abstraction from various aquifers across the region.	Planned
Abstraction licence trading	Trading under-utilised industrial abstraction licences, enabling the unused licence quantity to be employed by the Company for potable supply.	Planned

Increasing demand in warmer weather		
Monitoring customer views on frequency of demand restrictions	Engage with customers to garner their views on demand restrictions and willingness to pay.	Active (ongoing)
Expand discretionary use restrictions	Increase the uses of water that are classified as 'discretionary' and hence are easier to restrict in periods of drought.	Active (ongoing)
Tariff change to encourage saving water	Amending tariffs to increase the cost of water progressively with use (particularly with discretionary uses). Use of incentives to encourage water saving. Current price of water relatively low so doesn't encourage wise use.	Under consideration
Relaxation of barriers to demand options being funded through price review	Promote the relaxation of regulations that restrict the funding of demand measures through prices.	Under consideration
More input to new housing development planning	Currently SEW have a duty to supply for new developments but little input on strategy for new homes. This makes long-term planning more difficult, and added problem that demand will continue to rise.	Active (ongoing)
Reduce demand through household water efficiency measures and customer marketing campaign	Promotion of water efficiency measures and appliances to encourage wise use.	Active (ongoing)
Implement rainwater harvesting and grey-water reuse for domestic/commercial customers	Encourage - through awareness and discounted equipment - the use of rainwater and greywater for garden watering, car washing, etc.	Under consideration
Increase in metering	Beyond existing penetration levels, using compulsory metering powers available with the permission of the Secretary of State for Defra, in addition to optant metering, change of occupier metering and high consumption metering policies already in place, so as to enable customers to secure financial gain from reducing their use of water.	Active (ongoing)
Monitor demand in relation to weather variables	Use existing DI or meter data complemented by collection of weather data to identify trends in demand with changes in temperature and rainfall. This information can subsequently be utilised to manage demand.	Active (ongoing)
Increased land runoff		
Consider as part of catchment management plans (such as WFD programme of measures), with climate change	The impact of climate change to be incorporated into catchment management plans (including RBMP POMs).	Active (ongoing)
Liaison with stakeholders (e.g. NFU).	Discussion with landowners and users on their needs and foster partnerships in reducing run-off problems.	Active (ongoing)
Monitor and review; research into potential future changes.	Set up a monitoring system for land runoff and fluctuations with weather events to inform future measures.	Active (ongoing)
Expand water treatment capability	Accept worsening water quality and increase water treatment capacity to cope.	Under consideration
Education and awareness on management practices for land owners.	Awareness-raising of the problems/costs involved in treating water and encourage improved land management techniques.	Active (ongoing)
Partial treatment options for water. Point of use devices rather than central treatment; associated changes in standards.	Promote water reuse and use of partially-treated water; possibly with point of use devices for water treatment.	Deferred
Increase in risk of fluvial flooding		
Review any Flood Risk Assessments that cover areas where SEW assets are sited	This may facilitate prioritisation of high risk sites, because FRAs will contain assessments of climate change impacts on flood risk.	Active (ongoing)
Incorporate an appropriate margin for climate change in Periodic Review asset flood risk assessments	Investigate potential changes in return period and/or magnitude of fluvial flooding events and assess flood risk of assets as part of existing PR process. Propose to fund any adaptation schemes under the resilience driver.	Active (ongoing)
Implement protection or flood-proofing of assets at high risk of fluvial flooding	E.g. construction of bunds around high risk assets.	Active (ongoing)
Replacement or movement of assets at high risk of fluvial flooding	Option would need to be risk-based, and possibly phased. May be necessary for those assets at high risk.	Under consideration
Review arrangements for customer service, information and support in the event of outages	Raise awareness and review method of providing information to customers during flood events, and develop appropriate company-wide emergency response strategies.	Active (ongoing)
Incorporate climate change impacted flood events into topographic mapping/asset risk tool	Identify potential fluvial flood zones under climate change scenarios and use these to assess asset risk and prioritise adaptation measures.	Active (ongoing)
Amend assets' insurance policies to reflect climate change-impacted flood risk	As mentioned.	Under consideration

Increase in risk of groundwater flooding		
Review and upgrade where necessary pump duty and pump type at borehole sites	This will help to ensure there is sufficient range to accommodate and make use of (where licences permit) higher groundwater levels during groundwater flood events.	Under consideration
Carry out research into techniques to enable leaks to be fixed in flooded trenches	As mentioned.	Under consideration
Implement flood protection measures for underground water storage assets	Review any existing mechanisms and develop options for improving the flood resilience of underground water storage assets.	Active (ongoing)
Implement changed operation and maintenance regime to deal with higher groundwater levels	Change level transducers or lift pumps to allow for groundwater flooding.	Active (ongoing)
Ensure that future below ground installations (e.g. meters) are waterproof	Ensure that future installation of abstraction and DMA meters are waterproof.	Active (ongoing)
Review arrangements for customer service, information and support in the event of outages	Raise awareness and review method of providing information to customers during flood events, and develop appropriate company-wide emergency response strategies.	Active (ongoing)
Review any Flood Risk Assessments that cover areas where SEW assets are sited	This may facilitate prioritisation of high risk sites, because FRAs will contain assessments of climate change impacts on flood risk.	Active (ongoing)
Incorporate an appropriate margin for climate change in Periodic Review asset flood risk assessments	Investigate potential changes in return period and/or magnitude of groundwater flooding events and assess flood risk of assets as part of existing PR process. Propose to fund any adaptation schemes under the resilience driver.	Active (ongoing)
Raise head works	Raise head works above ground level (or higher depending on fluvial or surface water flood risk)	Active (ongoing)
Increase in risk of surface water flooding		
Implement protection or flood-proofing of assets at high risk of surface water flooding	Options could include construction of bunds around high risk assets and ensuring that surface water drainage systems (using SUDS where possible) are sufficient to attenuate and convey water off sites.	Active (ongoing)
Replacement or movement of assets at high risk of surface water flooding	Option would need to be risk-based, and possibly phased. May be necessary for those assets at high risk.	Under consideration
Review any Surface Water Management Plans that cover areas where SEW assets are sited	This may facilitate prioritisation of high risk sites, because SWMPs will contain assessments of climate change impacts on flood risk.	Active (ongoing)
Incorporate climate change impacted flood events into topographic mapping/asset risk tool	Investigate potential changes in return period and/or magnitude of surface water flooding events and assess flood risk of assets as part of existing PR process. Propose to fund any adaptation schemes under the resilience driver.	Active (ongoing)
Amend assets' insurance policies to reflect climate change-impacted flood risk	As mentioned.	Under consideration
Review arrangements for customer service, information and support in the event of outages	Raise awareness and review method of providing information to customers during flood events, and develop appropriate company-wide emergency response strategies.	Active (ongoing)
Review any Flood Risk Assessments that cover areas where SEW assets are sited	This may facilitate prioritisation of high risk sites, because FRAs will contain assessments of climate change impacts on flood risk.	Active (ongoing)
Incorporate an appropriate margin for climate change in Periodic Review asset flood risk assessments	Investigate potential changes in return period and/or magnitude of groundwater flooding events and assess flood risk of assets as part of existing PR process. Propose to fund any adaptation schemes under the resilience driver.	Active (ongoing)
Increases in leakage/ burst frequency		
Incorporate impacts of soil wetting and drying due to climate change scenarios into SEW's existing capital maintenance planning model	This will allow analysis of pipe cracking and movement caused by soil wetting and drying. Collection of weather and soil condition data and monitoring of this against burst frequency will need to precede this analysis.	Planned
Use heave-resistant pipeline materials and connected assets for system extensions / renewals	This will enable SEW to replace existing mains with mains constructed from more flexible materials, which will be better able to withstand freeze-thaw cycles and movement caused by soil wetting and drying, thus reducing burst frequency and leakage. Benefit in terms of greater resilience and longer lifetime of assets.	Under consideration
Incorporate an allowance for the benefits of climate change adaptation into the sustainable economic level of leakage calculation with respect to mains replacement activity	This would enable the presentation of a more robust economic argument for mains replacement versus other options such as rehabilitation or more active leakage control, taking into account the longer term benefits of adapting to climate change.	Active (ongoing)

Increase in outages from bad weather affecting assets and power supply		
Review existing outage response procedures more frequently	Review outage response procedures and when necessary invoke them more frequently.	Active (ongoing)
Investigate alternative outage response procedures	Investigate mechanisms for reducing the impact of power outages by, e.g. having more generators or back-up power supplies available across sites.	Active (ongoing)
Continue to monitor outage events using standardised template across sites	Ongoing collection of data will better inform Monte Carlo outage modelling, allowing SEW to plan for outage events effectively and consistently.	Active (ongoing)
Use of weather-related outage as a criterion for capital scheme selection	Include climate-related outage in the scheme appraisal process e.g. based on differential risk associated with different options.	Active (ongoing)

In addition to the information held within Table 8, the following aspects of each adaptation action have also been assessed;

- Primary impact of the climate variable – Here the impact caused by the changing climate variables are listed e.g. the impact caused by an increase in extreme rainfall.
- The likelihood of the risk occurring – Here the likelihood of the risk occurring pre-mitigation is detailed. This is rated from the lowest rating of ‘remote’ i.e. less than 10% chance of occurrence, to the highest rating of ‘almost certain’ i.e. a greater than 90% chance of occurring. Greater detail on the methodology of likelihood scoring can be found in Figure 3.
- Current business control effectiveness score – The effectiveness of business controls currently put into place by South East Water is rated from ‘awareness’ (low) to ‘optimised’ (high). More details on the methodology of control effectiveness rating can be found in Figure 5.
- Overall risk score – The pre-mitigation risk is scored from 1 (low risk) to 25 (high risk). The methodology of risk scoring is detailed in Section 4.4.
- Adaptation options – This category outlines the adaptation options identified by South East Water to mitigate against the appropriate risks.
- Adaptation status – This category details the current status of the adaptation option at the time this report was undertaken. The status of each adaptation option falls into one of five categories, namely; ‘completed’, ‘active (ongoing)’, ‘planned’, ‘under consideration’ or ‘deferred’.
- Post mitigation likelihood of the risk occurring – This represents the post-mitigation risk likelihood assigned to each risk after adaptations have been successfully implemented. For those adaptation options which are part of wider schemes, post mitigation likelihood scores are combined for the scheme as a whole. The methodology behind likelihood scoring assessments can be found in Section 4.4.
- Post mitigation risk score - This represents the post-mitigation risk score assigned to each risk after adaptations have been successfully implemented. For those adaptation options which are part of wider schemes, post mitigation risk scores are combined for the scheme as a whole. The methodology behind risk scoring assessments can be found in Section 4.4.

- **Barriers** – Potential barriers to the successful implementation of each option are listed. These may include factors such as technical limitations, regulatory issues, acceptability, and uncertainty in achieving results.
- **Interdependencies** – This details any interactions with stakeholders that may affect the successful implementation of adaptation options. More information on interdependencies can be found in Section 8.1.
- **Cost/ benefit analysis** – Defra, the Treasury Green Book guidance and UKCIP good adaptation principles stipulate that the cost of an adaptation measure must be proportionate to the risk it addresses and therefore the benefits that are yielded. It is important therefore that the costs and benefits of each adaptation option are assessed as part of any option appraisal; however, it is acknowledged that in many cases detailed costs and benefits will not yet be known, and in fact in some cases will be difficult to quantify. In this assessment, each option is given a cost-benefit ratio as a score of low, medium or high. These scores are not based on a quantitative approach, but give an indication of the relative ratio between options. The cost element considers both the CAPEX and OPEX of the option for its lifetime, including start-up and maintenance costs.
- **Timescale** - This is the timescale over which the option could be successfully implemented, and is given a score of ‘Short-’, ‘Medium-’, or ‘Long-term’. The designations are broadly aligned with water industry cycles; options achievable in the next AMP cycle period is classed as ‘Short’, options for the next 25-year strategic planning period are ‘Medium’ and anything beyond that is classed as ‘Long’.
- **Sustainability** - The options are assessed according to environmental, economic and social sustainability principles; with each option classified as Increasing (↑), Decreasing (↓) or Maintaining (-) each of the three principles. Where the short-term and long-term impacts differ substantially, they have been included separately for that option.
- **Carbon impact** - Each option is also assessed with regards to the carbon emissions associated with its implementation. This is a significant issue where we are also required to undertake mitigation of emissions in operations, and ideally there would not be a conflict with adaptation actions. Options are classified as either ‘Low’, ‘Medium’ or ‘High’. Most options are classed as ‘Low’ – for example, where the options is to under further investigations; however, some have a higher classification – for example, where the options results in increases in energy usage.

- Potential regret – This details potential regret associated with implementing that option, and takes into consideration the ease and cost of reversing the decision once the option is put in place, the uncertainty of its success, and the wider benefits the option may have. Each option is given a classification of ‘High’, ‘Medium’, ‘Low’ or ‘No’ – the last of these is specifically for options that are sensible courses of action regardless of adaptation planning, particularly if they are low cost and have wider benefits above and beyond climate change adaptation.
- Risk impact score breakdown - Pre and post-mitigation risk scores have been broken down into greater detail across a range of different categories, namely; financial, health and safety, public relations, regulatory, operations, assets, legal, information technology and other (including scheduling, environmental etc.). Each risk is assigned scores across these categories via the guidance contained in Section 4.4.

8. Addressing barriers and understanding interdependencies

8.1. Where you've identified interdependencies, how have these assisted or hindered actions to address climate risk?

In our first round report in 2011 we identified further work being required in order to understand and evaluate key interdependencies. Our further consideration of interdependencies has mainly assisted rather than hindered further actions we are exploring to address climate risk.

Within this report, the detailing of interdependencies has been developed. During the risk review process several key interdependencies were listed as below:

- Customers - Customers are central to every activity we undertake, and we see customer support as a crucial interdependency to our ability to adapt to climate change. A key part of our longer term adaptive strategy is to have a positive influence on customer water use behaviour and to deliver sustained long term demand management savings. This will rely upon delivering high customer satisfaction levels in the services we provide to them as well as positive and engaging reception to schemes we implement now and in the future. Our schools talks programme continues to offer water efficiency education and advice visiting 29 schools during 2013/14. These visits have helped us teach more than 2,700 pupils about the water cycle, where their water comes from, water treatment and water efficiency – pupils and teachers continue to be enthusiastic about taking our water efficiency four minute shower challenge.¹⁷
- Contractors/ suppliers – We are working closely with our contractors and suppliers to explore how we can tailor our existing working relationships to foster greater levels of adaptation. Failure to maintain the high levels of service we expect and be able to adapt under different climate conditions could lead to projects overrunning or even being cancelled. This, along with the potential for higher financial costs due to poor performance could negatively affect the outcomes of adaptation options. A close and successful working relationship with service providers will ensure that we realise greater than predicted benefits from adopting more adaptive approaches and solutions, which in the longer term will allow savings in time and costs.
- Local communities – Some adaptation options will impact upon local communities. Therefore it is essential that throughout both the planning and implementation stages those customers from local communities are kept informed and have input into the process. This will be done by media campaigns, focus groups, joint initiatives, funding local activities, school talks etc. Failure to engage with local communities could severely limit our ability to deliver adaptive measures.

¹⁷ South East Water. 2014. Environmental and Social Achievements Report 2013-14. South East Water, Snodland. pp23.

- Land owners – We see catchment management as a key adaptation tool. We are working closely with regulators, land owners, communities and stakeholders during the period 2015 to 2020 to deliver a detailed programme of catchment management investigations and pilots. The outcomes of our programme will be delivery of adaptation options that allow greater resilience of the natural systems we abstract from, protecting water availability and water quality, and the environment. Catchment management requires that a close working relationship be developed/ maintained with the owners of land falling under our catchment areas. Any adaptation options that require the purchase of new land or access via land other than our own will also require a positive relationship to be developed/ maintained with land owners.
- Media – Our relationship with the media is a key interdependency for numerous adaptation options. One aspect of media interaction that is key to the successful implementation of adaptation options is the use of media to enhance and amplify key messages. For example, local newspapers/ radio used to promote certain demand management and using water wisely initiatives. Failure to collaborate effectively with the media could severely limit the extent of progress we make with adaptation options. Successful collaboration with such media outlets could see the outcomes outperforming previous targets as an increased number of customers could be reached effectively.
- Other water companies – We have a good track record working closely with neighbouring water companies through the WRSE group, including the sharing of water through existing bulk supplies. We will make best use of those existing working relationships to allow greater levels of adaptation action to be realised at local, regional, national and in some cases international levels. The level of success derived from several adaptation options also depends upon the ability of water companies to share information and experience via various channels such as is being achieved through WRSE. Information sharing lowers costs as several aspects of programmes will avoid duplicating work carried out by other water companies. Several programmes will also benefit from joint ventures in order to increase expertise and spread costs/ risk and best practice.
- Planning authorities/ local councils – Several adaptation options require the construction of new assets both on and outside of land we currently own. This will require the cooperation of local planning authorities and the local council to ensure planning permission for any such measures is agreed. Failure to achieve planning permission may cause adaptation options to be limited or unsuccessful due to a lack of feasibility. At the very least, the option will need to be reassessed. Any obstacles to the planning process will cause both a financial loss and a loss of man hours. Planning authorities also have a key role to play by supporting/ partnering the delivery of our demand management and using water wisely programmes.

- Regulators (Ofwat¹⁸, Environment Agency, Drinking Water Inspectorate etc.) – Regulators are a key interdependency in a majority of the adaptation options we have identified. We rely on guidance from our regulators to inform decisions regarding a wide range of operations. For example, Ofwat sets targets with respect to a vast array of key performance indicators such as customer satisfaction (SIM score), interruptions, water quality etc. Failure to meet such targets may result in financial or reputational penalties such as outcome delivery incentives (ODIs)¹⁹. We also have numerous statutory duties to fulfil. Therefore, the relationship we experience with regulators is crucial to the successful day to day operations of our company. With respect to adaptation options, funding must be obtained via the price review process. Alterations made to existing South East Water operating procedures are required to be approved by the relevant regulatory organisation. For example, alterations to abstraction licenses will be reviewed by the Environment Agency. Regulatory approval of adaptation schemes is essential. Failure to obtain such approval will ensure that adaptation programmes are delayed by a review process. In cases where they are not agreed by regulators after review processes have been completed, the adaptation option will not implemented.
- Technology developers – Technology within the water sector is constantly evolving. Some of the adaptation options we have identified either require advances to be made within the technology currently available, or for technology to advance sufficiently in order to make the purchase of such technologies affordable. Therefore, the advancements made by technology developers are essential to the affordability and viability of several adaptation options. Some programmes may need to be reassessed on a regular basis in order to review each programmes feasibility in light of technological advancements, there have been user groups created within South East Water that are designed to address these particular issues.

¹⁸ The Water Services Regulation Authority

¹⁹ We have selected 25 ODIs for the period 2015-2020. ODIs require us to attain certain levels of performance in key areas such as customer satisfaction, water quality, environmental etc. or incur a financial and/or reputational penalty (up to £47.3m for AMP6). If these targets are exceeded, financial and/or reputational rewards can be earned (up to £20.3m for AMP6).

8.2. What were the main barriers to implementing adaptation actions and why?

We have identified several areas in which barriers provided potential difficulties in implementing adaptation actions, namely:

- Regulatory - different pressures imposed by different water industry regulators result in companies needing to develop options that meet opposing objectives, e.g. Ofwat: least cost outcome; Environment Agency: best environmental outcome. Although the regulatory framework has a long-term view (25 years ahead), there is no unified approach through which adaptation to the long-term risks of climate change can be implemented. Ofwat's new duty to ensure resilience might offer an opportunity to reduce barrier challenges.
- Financial - some adaptation options, e.g. increased winter storage capacity, water re-use, desalination etc. may have significant short/medium-term financial consequences, but position South East Water robustly to meet long-term needs. Inevitably with large investment, there will be increased scrutiny of the need; therefore where climate change is a major driver, risk and uncertainty will need to be balanced appropriately. However, where a need has been identified based on current drivers, e.g. a supply-demand deficit including moderate climate change impacts, climate change adds weight to the evidence of need.
- Environmental constraints - e.g. designated conservation areas, which may limit the extent of new development relating to water resources or water treatment works not just identified in adaptation plans but in all plans. We will look to identify options that will provide, where feasible, a net environmental gain to ensure it achieves support. We aim to operate efficiently and to minimise our environmental impacts through prudent use of natural resources, preventing pollution, reducing carbon emissions and waste production. Throughout all our work we will implement policies and strategies to take account of the effective protection of the environment.²⁰
- Technical - issues such as knowledge of impacts, and the ability to apply climate information to company-specific assets and circumstances. This can be addressed in due course by greater collaboration and sharing of information within the water sector.
- Socio-political - there may be resistance to some supply side measures if they require large amounts of construction; similarly demand management in the form of metering and tariff setting will raise issues of affordability that will need to be addressed. This emphasises the need for a balanced assessment of drivers and risk so that customers, investors and regulators can see a clear case for action/investment that weighs up current and future need.
- Competition - the advent of competition may make inter-company cooperation more difficult/complicated in the case of shared resources and joint schemes.

²⁰ South East Water. 2014. Environmental and Social Achievements Report 2013-14. South East Water, Snodland. pp6.

8.3. Have new barriers been identified? Are these being addressed? If so, how?

Several new barriers have been identified as part of the internal risk review process at South East Water. Many of the barriers described are not in our direct control, and for others we have only limited influence. Where a barrier involves regulation, either at regulator or government level, we will only have a limited ability to influence how policy may change. Many of the technical challenges could be addressed in-house; however, other resources we use – for example, UK projections of climate change – are dependent on other organisations, and therefore we cannot always control the speed with which technical development is made.

We are also aware of potential impacts of climate change ‘upstream’ of our operations, i.e. in the supply chain. It is expected that climate change may have an impact both on the availability of resources such as power and chemicals, which South East Water will incorporate into our adaptation plan.

Dialogue with regulators and other stakeholders through existing channels (e.g. the Environment Agency, water resources and business planning, procurement processes etc.) form a strong part of our adaptation plan for all options, in addition to South East Water’s communications strategy. In this way, knock-on impacts (both of our actions on others, and of others’ actions on us) can be identified, reduced and/or removed where appropriate.

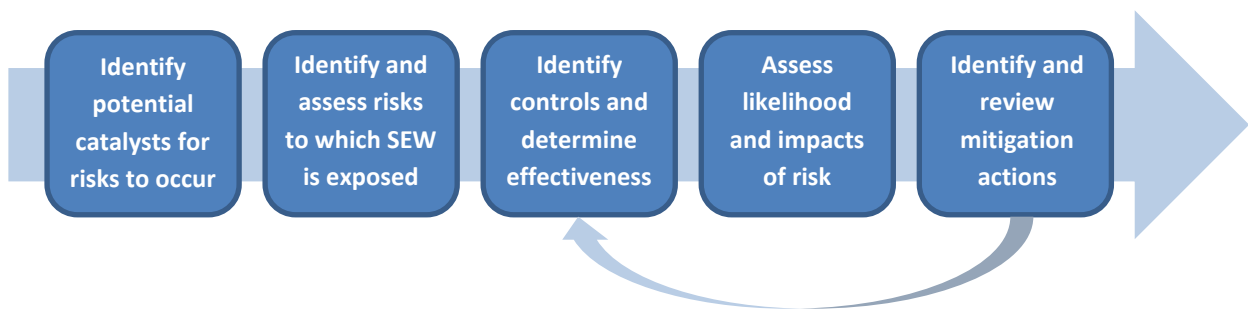
9. Monitoring and evaluating

9.1. How effectively has consideration of climate change risks been embedded within your sector or organisation?

As previously mentioned within this report, we have made significant progress with embedding a risk management culture within our organisation since the last round of reporting in 2011. Using the methodology previously outlined within Section 4.4, every climate change risk that we have identified has been assigned, monitored, and reviewed on a monthly basis, and updated as appropriate.

Each climate change risk has been assessed and quantified to an owner within the company who is responsible for the task of risk monitoring and delivery of mitigation/ adaptation measures. The owner of the risk has detailed the current business controls in place and measures the effectiveness of these activities in controlling the risk. Each risk has been assessed with respect to the likelihood of the risk occurring as well as potential impacts across a wide range of areas including financial, health and safety, public relations, regulatory, operations, assets, legal, information technology and other (including scheduling, environmental etc.). Mitigating actions are identified via internal processes and consistently updated to reflect those currently in progress or under consideration. Mitigating actions that we have undertaken are then considered to be new ‘business controls’ and included within the calculation of risk likelihood and impact. This process then repeats itself as represented in Figure 6.

Figure 6: South East Water risk review process



All climate change risks are presented in a monthly report; each risk owner must also present their assigned risks before the board of directors once per annum. This process ensures that all risks, including those caused by climate change, are under constant review and deeply embedded within business planning moving forward.

The risk review process has been incorporated into numerous facets of strategic long term planning. Climate change risk is included heavily into the WRMP14 and has been fed into our prioritisation of asset replacement and refurbishment programmes, specifically those planned for completion during the period 2015 to 2020.

During the price review process, we proposed to Ofwat that we required a supply demand adjustment to the amount of total expenditure (TOTEX) awarded. This adjustment allowed us to meet the demand of customers within the 2015/20 period and beyond in the face of challenges posed to our water supply. South East Water's evidence and awareness of climate change risks were a key element in the decision process during this review and represents the fact that we had considered the impact climate change will have on business activities moving forward.

9.2. How effective have organisational monitoring and evaluation processes been to ensure adaptation responses are implemented and on track? If these have not been effective, what barriers prevented this?

The risk review process summarised in Section 9.1 ensured that both risks and their mitigating actions are monitored on a regular basis. However, there are numerous internal processes we have implemented to successfully monitor adaptation responses. Details of these can be found below:

- Asset management programme – We currently operate a sophisticated and detailed database of the company's assets (Pioneer). This database also models failure scenarios where assets stop operating or operate below an acceptable standard. Climate change impacts are included within these scenarios. This modelling also projects an asset's operational lifetime and therefore predicts when assets will need to be replaced. This information is incorporated into our capital management decisions in order to ensure the high level of service to customers is upheld. Data quality and reliability can cause potential barriers to the successful implementation of these sophisticated models; however data quality assurance and rigorous capital replacement schemes assist in mitigating this.
- Carbon reporting – We have a regulatory requirement to report on the amount of greenhouse gas emissions produced by both the company, and contractors while undertaking activities on our behalf. We undertake internal reporting bi-annually as well as an external report once per annum as a statutory requirement. Our customers have been clear that they expect us to manage our carbon emissions but that they do not expect to pay more to fund this improvement. In our 2015 to 2020 business plan for we have committed to reducing our emissions further (we are committed to reducing carbon emissions by 1.8% by 2020) and we will deliver this through optimisation of our water sources and our network of pipes.²¹ This reporting will ensure that programmes that ensure a reduction in greenhouse gas emissions are kept on track. Time lags are a potential barrier as the yearly statutory requirement for carbon reporting leaves a twelve month period with little carbon emissions monitoring. The six month interim report we carry out internally minimises the effect of time lags.

²¹ South East Water. 2014. Environmental and Social Achievements Report 2013-14. South East Water, Snodland. pp16.

- Regulation and price review – As part of Ofwat’s regulation of the water industry, we undertake annual performance reporting, monitoring a wide range of business activities such as leakage, distribution input, SIM score etc. This is undertaken internally twice per annum and is reported to Ofwat annually. Along with many other statutory requirements, the price review process required us to report on a wide range of performance indicators to be included within Ofwat’s econometric modelling to determine the amount of TOTEX to be allowed to us for the period 2015 to 2020. We were required to demonstrate that all our programmes are affordable and attainable with a significant amount of evidence. The selection process is born out of setting targets or face potential penalties. If these targets are exceeded, rewards can be issued also. Due to the amount of financial and reputational rewards and penalties, we are incentivised to track the progress made with regards to the targets and our adaptation options contribute to the outcome of this, the incentives and disincentives have aided adaptation actions to keep on track via a rigorous monitoring process.
- Production planning – We currently produce a water supply production plan on a monthly basis. Every water source is assessed on both license usage to date, and ability to meet demand in the future. We have the ability to take account of outages either planned or unplanned in real time, to prevent adverse effects on customers and the environment. The agility of our production plan makes it an extremely useful tool in ensuring adaptation options are implemented to ensure that we are able to maintain a high level of service to customers at all times. The production plan therefore drives performance and efficiency in our capital and maintenance programmes (including those that mitigate against climate change impacts) and ensures that such programmes are selected with a high level of scrutiny.
- PMO Group – the Project Management Office (PMO) is a steering group tasked with ensuring our capital programme is delivered efficiently and appropriately. All future projects are reviewed and authorised against the approved budget, while ongoing and completed projects are also reviewed to ensure they have been delivered effectively. The PMO group is chaired by the Director of Assets and Regulation, and includes key stakeholders across the business. The assessment of climate change benefits and risk forms a key consideration by the PMO.
- User groups – User groups are held regularly including individuals from a wide range of departments with a vested interest in a particular aspect of our operations and duties. For example the telemetry user group (TUG) is made up of employees from assets, operations, water resources and engineering. The TUG hold meetings on a monthly basis where any issues with regards to telemetry throughout the company are raised. User groups are an effective vehicle to ensure programmes are kept on schedule and produce a successful outcome.

9.3. How effective were monitoring and evaluation processes in determining how the organisation/sector handled recent extreme weather conditions?

Existing regulatory requirements to have in place drought management plans, and to complete flood risk assessments and mitigation plans (in addition to existing need to consider the impacts of climate change in our strategic planning) proved to be very effective during the drought and winter storms that have occurred since the first round of reporting was completed in 2011.

Our existing monitoring and evaluation processes fared well during these events. As explained in Section 4.1, we gained more insight into the resilience of our infrastructure to flooding and what further measures we have been taking to improve our resilience to power outage.

9.4. Has the sector/organisation identified any financial benefits from implementing adaptation actions?

Cost benefit analysis has been undertaken on almost all adaptation options with regards to both operating expenditure (OPEX) and capital expenditure (CAPEX). Therefore each of the implemented adaptation options that has been assessed to have been more cost beneficial than a comparable scheme or had an investment return period within acceptable thresholds.

We have selected 25 outcome delivery incentives (ODIs) for the 2015/20 period. These ODIs are designed to protect customers from the non-delivery of key performance indicators. ODIs require South East Water to attain certain levels of performance in key areas such as customer satisfaction, water quality, environmental etc. or incur a financial penalty (up to £47.3m for AMP6). If these targets are exceeded, financial rewards can be earned (up to £20.3m for AMP6).

Several adaptation options have been identified as having possible financial benefits. Although many of which are not currently quantifiable, the method by which each adaptation option can return financial benefits is detailed below:

- Increased service reservoir capacity – Increased service reservoir capacity will enable us to utilise pump scheduling to ensure less energy consumption during higher tariff periods. Increased reservoir capacity will also allow us greater flexibility when pursuing energy demand balancing activities. Increased reservoir capacity also allows greater flexibility when optimising water sources to meet changing demands.

- The development of new water sources – The development of new water sources will utilise current, cheaper technologies such as more efficient pumps and treatment methods. Cheaper water sources will be able to decrease the pressure placed upon more expensive sources (such as bulk supplies) and therefore incur lower energy and treatment costs. Our most expensive water sources can be 18 times more expensive to abstract, treat and distribute than the cheapest water sources. These new sites also have the option to be installed with automated processes, possibly saving man hours that would have been used on an older, manual site. Increasing flexibility in abstraction licenses or increasing capacity at cheaper water sources will also incur similar benefits.
- Increase in metering and demand monitoring – An increase in customer metering as a result of the customer metering programme (CMP) which aims to have 90% of customers by 2020 will allow us to utilise leakage detection techniques with greater levels of accuracy and sophistication. Any savings in leakage will lead to less water being abstracted, treated and distributed in order to meet customer demand, therefore saving energy and treatment expenditure. An increase in the sophistication of demand monitoring at the customer tap will also give us a greater understanding of changing customer demand and allow us to better manage the supply network using customer demand forecasting.
- Leakage – During the 2013/14 financial year, our average leakage figures equalled 92.56 million litres per day (17.69% of distribution input). This water lost via leakage has incurred abstraction, treatment and distribution costs before being lost within our network. Therefore any adaptation options that will realise a saving in leakage will also result in cost savings also.

9.5. Has there been sufficient flexibility in the approach to adaptation within the sector/organisation, which allowed you to pursue alternative courses of action? If not what remedial measures could you take to ensure flexibility?

We do believe there is a good level of flexibility available to us to develop greater levels of adaptation within the processes we already operate and in the way we develop our future plans.

10. Opportunities and benefits

10.1. What action have you taken to exploit opportunities? How effective were your efforts?

We have ensured that a risk based approach is taken to how we operate and we plan for the future, and that we embed climate change adaptation into our key processes.

As part of the risk review process performed internally by South East Water, opportunities are also assessed and monitored on a regular basis. Opportunities are assessed using the same methodology as used in Section 4.4. However, the impacts incurred by each opportunity are assessed via the thresholds represented in Table 9.

Table 9: Opportunity impacts matrix

Descriptor	Insignificant	Minor	Moderate	Major	Significant
Financial	<£100k of budget or revenue.	£100k-£500k of budget or revenue.	£500k-£1m of budget or revenue.	£1m-£5m of budget or revenue.	>£5m of budget or revenue.
Schedule	Little or no benefit.	Decreases duration by >2.5%.	Decreases duration by >10%.	Decreases duration by >25%.	Decreases duration by >100%.
Safety	Insignificant change to risk of injury.	Risk of injury reduced.	Risk of injury significantly reduced.	Risk of injury minimised.	Risk of injury eradicated.
PR / Profile	Some praise, some benefit to project, client, and stakeholder reputation realised.	Positive local publicity or media attention.	Attention from media and/or significant praise by local community.	Significant positive regional and State media coverage / community.	Vast positive international and/or national coverage / community.
Regulatory Relationships	Insignificant improvement to relationship with regulators.	Improved working relationship with regulators.	Significantly improved working relationship with regulators.	Formal acknowledgement of company performance	Government level acknowledgement of company performance.
Build Quality	Insignificant change to risk of damage.	Risk of property damage reduced.	Risk of property damage significantly reduced.	Risk of damage to company property minimised.	Risk of damage to company property eradicated.
Operational	Negligible impact /no significant impact on personnel.	Minor change to operations / some benefit to personnel.	Moderate improvement to operations, work routines and schedules.	Noticeable improvement to operations, work routines and practices - fewer resources may be required.	Significant improvement to operations, work routines and practices - fewer resources may be required.
Environment	No effects or effects which are below levels of perception.	These effects may be raised as local issues.	Important considerations at a local level.	Important considerations at a local or regional scale.	Associated with sites and features of national or state importance.
Property / Assets	Insignificant change to risk of damage.	Risk of asset damage reduced.	Risk of asset damage significantly reduced.	Risk of damage to company assets minimised.	Risk of damage to company assets eradicated.
Social / Cultural Heritage	Negligible social or cultural impacts.	Minor medium term social impacts on local population.	On-going social issues /permanent benefits to structures or items of cultural significance.	On-going, significant social impacts / benefits to structures or items of cultural significance.	Widespread, on-going, significant, social impacts.
Legal	Some minor non-compliances and breaches of regulation avoided.	Minor legal issues, non-compliances and breaches of regulation with option for legal recourse avoided.	Serious breach of regulation with investigation or report to authority with prosecution and /or moderate fines possible avoided.	Major breach of regulation /major litigation avoided.	Significant prosecution and fines /very serious litigation including class actions avoided.
Systems, Information and Data	Negligible benefits to IT and communications.	Minor benefits to IT and communications.	Moderate benefits to IT and communications.	Major benefits to IT and communications.	Extensive benefits to IT and communications assets and infrastructure.

We have identified eight climate change opportunities as part of the risk review process. Each opportunity has been listed and described in Table 10. Further to the information held within Table 10, the following aspects of each opportunity have been assessed;

- Thresholds above which each opportunity will affect South East Water business functions;
- The distribution (spatial/ temporal) of each opportunity;
- The company’s change in exposure to the opportunity;
- The assessed opportunity;
- The probability of the opportunity occurring;
- Opportunity score analysis across a range of different categories, namely; financial, health and safety, public relations, regulatory, operations, assets, legal, information technology and other (including scheduling, environmental etc.);
- Evidence to support analysis;
- Quality of the evidence used;
- Details on any gaps or assumptions made during the analysis of the opportunity.

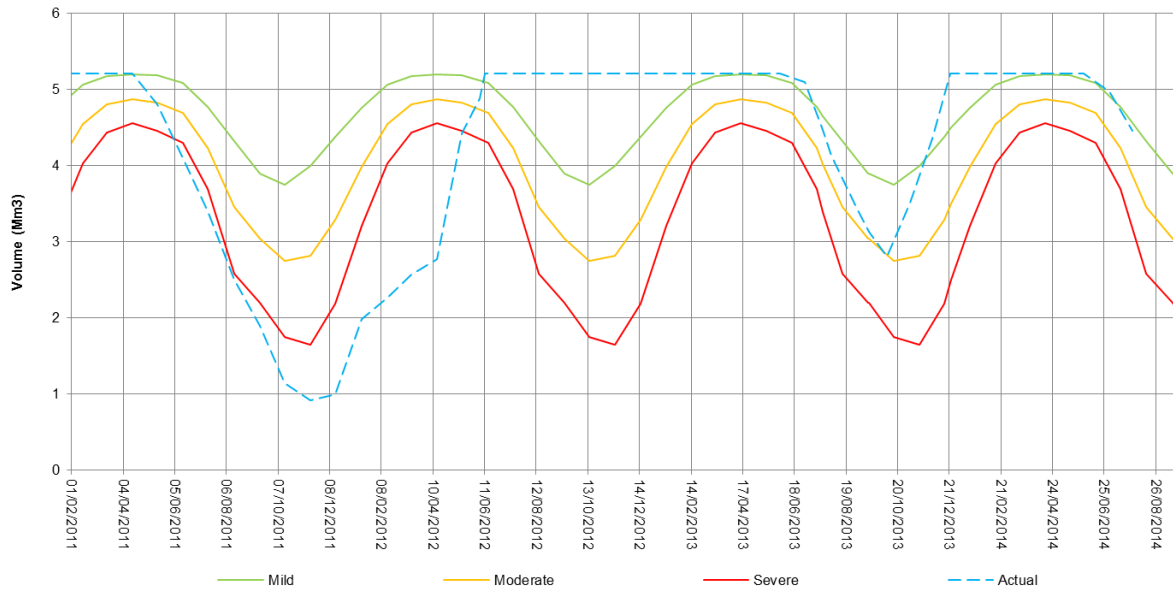
Table 10: Opportunities identified by South East Water

Climate change impact	Description
Water resources	
Increase in winter recharge	Increase in winter rainfall providing the opportunity for development of increased capacity and storage.
Modifying the way in which option appraisals are carried out. Greater extremes considered	Severe event thresholds can be defined and assessed. Risk based planning methods (different scenarios e.g. range of droughts/scenarios) can be developed rather than analysing a 'general' drought.
Stimulates niche markets for climate change issues	SEW could assist in the development of alternative supplies or engage with 3 rd parties as part of the WRMP and drought plan processes in order to identify measures to help adapt to extreme weather events. SEW could help to identify and subsidise potential areas for innovation.
Increased scope for working relationships to be developed within other industries	Climate change can increase the scope for developing working relationships within other industries such as working with other (smaller) water resource licensees and water resource development sharing. 3 rd parties may be able to provide short term (temporary) options during severe events (e.g. tankering water by sea). It may also be possible to develop alternatives to potable water for certain industries (e.g. window cleaning/ garden watering). Local storage solutions could also be provided by 3 rd parties.
Asset management	
Increase in frequency of mild winters leading to a decrease in leakage	Milder conditions in winter have the potential to decrease in freeze-thaw damage to pipes and assets, thus reducing leakage and the frequency of burst pipes. Modelling studies indicate that under a 'Mid' climate change scenario, frost days could decrease by up to 10 days per year by the 2020s. This opportunity does not need a particular adaptation option for SEW to benefits; however, the focus of leakage loss can move to issues with heave, which may increase under climate change.
Water quality	
Increased efficiency of water treatment processes	Increased temperatures will speed up chemical and biological treatment processes for water.
Energy & carbon	
Availability of green energy sources improved	Flexible energy contracts allow greater scope for utilisation of power purchase agreements. Therefore SEW can be more agile in the purchase of energy from wind or solar farms. Also greater scope for self-generation opportunities.
Extreme weather events causing outages on the national grid, unbalancing the network	Demand response is an alternative approach to grid balancing. This provides National Grid with a cheaper, cleaner and quicker answer to energy supply fluctuations than running a power station sub-optimally. In return, energy users who offer this service receive a payment from National Grid.

We have analysed each potential opportunity as well as the actions required by us in order to take full advantage of such opportunities. The actions we have undertaken as well as details on their effectiveness are listed below;

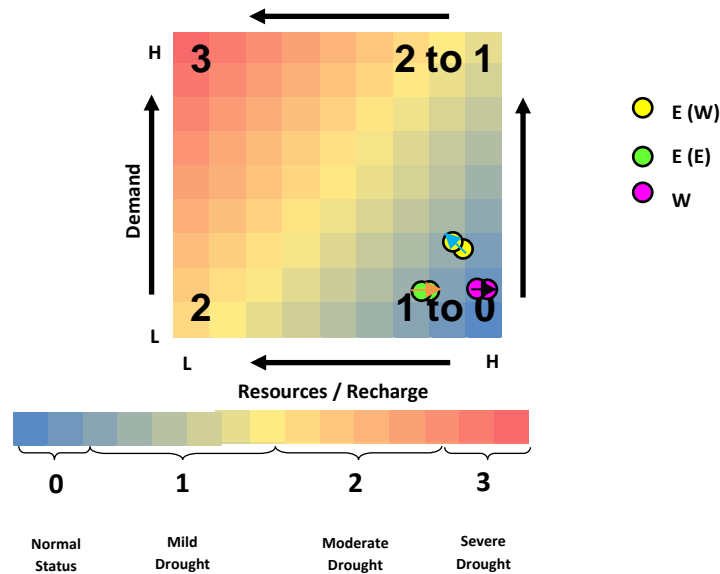
- Increase in winter recharge – We will use available rainfall throughout the year to optimise pumping into our reservoirs to keep the storage levels in them as close to full capacity as possible. This is clearly represented by Figure 7 where the relatively wet winters of 2013 and 2014 have resulted in the filling of Ardingly reservoir to full capacity.

Figure 7: Actual volume vs. drought curves for Ardingly Reservoir



We also track groundwater and reservoir storage levels every month to produce a drought risk assessment that in turn determines what level of drought mitigations measures (if any) it is appropriate for us to be carrying out. This is in accordance with our statutory Drought Plan. Drought status is based on Recharge, Groundwater Levels, Reservoir Storage and Demand and is represented by Figure 8.

Figure 8: Drought trigger schematic



- For WRMP14, we modified the way in which the appraisals of supply demand options were carried out. We considered the performance of options under greater extremes and by applying multi criteria analysis (MCA) process in order to constrain feasible options on the best performing options available to us. Criteria for scoring options were developed using the following:
 - SEA/Sustainability related objectives including climate change, carbon cost / energy considerations.
 - Promotability objectives related to planning or regulatory approval.
 - Technical objectives covering yield or savings certainty and risk, flexibility, technical difficulty.
 - Cost/Financial objectives - development and operational cost based on generic assumptions, potential mitigation costs and financial uncertainty.

Utilising greater extremes within the WRMP and optioneering process, we were able to assess different severities of drought to ensure that options considered within the WRMP14 were reliable. This process led to 320 feasible options being identified within the WRMP14. Details on the optioneering process used throughout the WRMP14 can be found in Section 7 of the WRMP14.

- Stimulates niche markets for climate change issues - Climate change suggests there may be hotter drier summer periods. In response, and to help support innovation in the market for adaptation measures, we offer our customers free water saving devices on request. These devices include;
 - Toilet flush saver – This device can help customers to save up to 1.2 litres of water every flush.
 - Shower timer – Showers use a significant amount of water. By cutting the amount of time our customers spend in the shower, we can help to reduce the demand of customers.
 - Water saving shower head - The Croydex Maxi Four Function Eco Shower Head includes a water saving device which reduces water usage by up to 50 per cent.
 - Water stick - Water stick is a moisture probe that senses when the time is right to water house plants.
 - Toilet leak detection tablets - The dye tablets are used to simply identify leaks in the toilet that can waste water.

The overall impact the devices listed above have upon customer demand is difficult to quantify, but we strongly believe they promote a more adaptive and sustained behavioural change by our customers making them and use more resilient to the impacts of climate change.

- Increased scope for working relationships to be developed within other industries – During the WRMP14 process, we contacted every water abstraction licensee within our company boundaries in order to explore options available of working together to agree water trading agreements during drought conditions or to explore the possibility of third party water supplies.²² These negotiations are still ongoing, therefore no benefits have yet been realised to date. We see the development of third party options for managing extreme weather events as an area of real opportunity and we are considering how we explore this further at the present time.

²² South East Water. 2014. Water resources management plan 2014, South East Water, Snodland, Appendix 7, Paragraph 159, 38pp.

- Increase in frequency of mild winters leading to a decrease in leakage - There will be a reduction in bursts particularly cast iron mains and supply pipes associated with a mild winter although in the longer term it will be deferral rather than avoidance. There will also be an increase in bursts in private internal plumbing. Historic data from South East Water suggests that an increase in bursts is triggered if the temperature reaches certain thresholds. Over the years points of weakness caused by deterioration will fail with a trigger such as change in behaviour of the pipe material or ground movement caused by low temperatures. We have committed to reducing leakage to 88.1 MI/d by 2019/20.

There will be benefit in meeting not just leakage but also interruptions targets more easily. We have committed to reducing interruptions to customer supplies to an average of 12 minutes per property by 2019/20.

Less investment may be needed to avoid penalties if we have fewer bursts. If we are at a “reward” level we can decide not to use expensive technology to avoid interruptions over three hours where the reward is not cost beneficial. Fewer bursts will also cause less water quality issues with discolouration. There will be some offset of benefit overall due to the increased drying out of shrinkable clay in prolonged hot dry summers.

- Extreme weather events causing outages/ spikes on the national power supply grid, unbalancing the network – Negotiations with demand balancing companies are at an early stage in order to determine whether this potential opportunity is both practical and cost-beneficial. This opportunity allows a service provider to operate our assets (within usual parameters) in order to balance the national grid, therefore providing a means of revenue opportunity.

- Availability of green energy sources improved – Climate change may cause an increase in renewable wind energy, providing a means of switching from 3rd party grid energy, thus bringing costs savings and reduced reliance (i.e. mitigation of energy outage). Climate change may also cause an increase in renewable solar energy arising from increased solar incidence, therefore providing a means of switching from 3rd party grid energy, thus bringing costs savings and reduced reliance (i.e. mitigation of energy outage).

With regard to feasible use of renewable energy we have undertaken studies to test both the cost and operational effectiveness of integrating the technology. A number of studies have revealed that our sites are currently not effective for wind turbines; however we continue to monitor the situation as we are aware that both technology and conditions are continually evolving.

With regard to solar opportunities our desk-top studies have identified that our remote service reservoir sites offer the best solution with regard to practical installation of solar panels. However these sites are generally designed to distribute water by gravity, and therefore the energy requirements at these sites are minimal and their remote location offer little opportunity for export to surrounding sources. It should be noted currently the cost-benefit of introducing such technology is not significant and any installation also provides challenges to an operational site (i.e. access to assets for maintenance, cleaning, etc.).

The challenge notwithstanding, however, we continue to assess the potential, particularly as part of any planned refurbishment work. While there are limitations and challenges of integrating renewable technology on our operations sites we have also seen some interest from adjacent land owners to switch their land use to renewable “energy farms” and export energy to our sites. We are in dialogue with a number of opportunities and have provided support and encouragement to progress these possibilities. We are aware of a number of opportunities that climate change may bring to our business. At the time of writing a number of these opportunities are at a preliminary stage, while other opportunities have proven not to be cost-beneficial currently. We accept this is a snap-shot decision of current factors and we continue to monitor the situation.

11. Conclusion

This report has been written in response to Defra's direction to report under the 'Climate Change Act 2008' and the report called '2013 Strategy for exercising the Adaptation Reporting Power and list of priority reporting authorities'. Although this report was voluntary, we welcomed the opportunity to demonstrate progress we have made taking steps to ensure we successfully adapt.

In producing the report, we have used Defra's guidance on how to report progress in planning for climate change. This guidance laid out four main criteria in order for South East Water to demonstrate preparedness in relation to this issue namely;

- Understanding climate risk
 - Nine critical impacts that climate change will have upon business functions have been identified, namely;
 - Reduction in surface water availability;
 - Reduction in groundwater availability;
 - Increasing demand in warmer weather;
 - Increased land runoff;
 - Increase in risk of fluvial flooding;
 - Increase in risk of groundwater flooding;
 - Increase in risk of surface water flooding;
 - Increases in leakage/burst frequency; and
 - Increase in outages from bad weather affecting assets and power supply.
 - South East Water has clearly demonstrated that climate change risks are closely monitored on a regular and consistent basis. Since the last round of reporting in 2011, this has included the development of sensitivity and threshold analysis, risk distribution analysis, risk likelihood analysis, risk scoring assessments, business control assessments and evidence updates and analysis.
 - Although we still observe many of the uncertainties from the previous round of reporting in 2011, understanding and awareness of these uncertainties has improved.

- Details of actions: implemented and new
 - Climate change adaptations are monitored and assessed on a regular basis. This review process includes regular assessments of;
 - Adaptation status
 - Assessments of barriers to adaptation implementation
 - Analysis of interdependencies identified in order to successfully implement adaptation actions
 - Cost-benefit analysis of both OPEX and CAPEX
 - Timescale for adaptation actions implementation
 - Sustainability analysis across environmental, economic and social categories
 - Carbon impacts
 - Potential regret analysis
 - Post mitigation likelihood analysis and
 - Post-mitigation risk assessments.
 - Included within this report is in-depth analysis of adaptation actions for risks assessed to have significant impacts upon our business functions.

- Monitoring and evaluating
 - It has been clearly demonstrated that the internal risk review process as well as statutory requirements has ensured that climate change risks have been successfully embedded within the organisation.
 - As part of the risk review process as well as numerous internal and external requirements, adaptation options are closely monitored and reviewed.
 - Processes that we have already put in place have ensured that recent extreme weather events did not have a significant detrimental effect across our business functions.

- Opportunities and benefits
 - Several opportunities have been identified as part of the risk review process.
 - Where it has been possible, we have taken advantage of identified opportunities and have successfully monitored the benefits experienced as a result.
 - Although some of the opportunities either require no action on behalf of South East Water or are currently being reviewed, it has been demonstrable that we are closely monitoring the situation in each of these incidences.

Outside of this report, we continue to closely monitor and review climate change risk and adaptation options as part of our internal risk review process. In continuing to embed climate change risk into our risk management culture, we acknowledge that there is substantial benefit to be gained from embedding adaptation into standard practices.

The assessment of climate change risks has become increasingly necessary for both our short and long-term planning. This includes identification of new suitable adaptation options, as well as reviewing adaptations already identified – whether these options are currently implemented, planned, under consideration or deferred.

Our understanding of climate variability as well as numerous other factors such as improvements in technology, affordability of adaptation options, demand profile alterations etc. ensure that the consistent review process we have implemented is imperative in order to successfully monitor our position with regards to climate change. The information provided in this report shall therefore provide a source from which future adaptation assessments can be drawn, to ensure that South East Water has a consistent basis for adaptation.

Reference and evidence list

In addition to the references and evidence used in the first round report:

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Appendices

Appendix A: Original Defra direction letter



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ME6 5AH

Adapting to Climate Change
Area 3A
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SW1P 3AL

February 2010

Dear Ms. Stimpson,

Direction to report on adaptation under the Climate Change Act 2008

We sent you a draft Direction for comment on the 15 December 2009. As we received no response from your organisation, we assume you had no concerns and so are now formally issuing the Direction. In this letter we explain the Direction, the reporting process, and answer questions that have arisen from other reporting authorities' responses.

Please find the Direction attached; this is a legal instrument, which places a requirement on you to report, outlining the issues covered in the Direction, and to deliver a report **by 31 January 2011**.

1. Amendment to the explanatory note to the Direction

Please note that we have made a slight amendment to the explanatory note of the Direction, and removed the points (b) and (c) from the following paragraph:

"In preparing the report, the reporting authority is required by section 63(3) of the Climate Change Act 2008 to have regard to:

- a) the guidance issued by the Secretary of State under section 61 of the Climate Change Act 2008;

- b) the most recent report under section 56 (report on impact of climate change) of the Act (if there is a report);
- c) the most recent programme under section 58 (programme for adaptation to climate change) of the Act (if there is a one)."

We removed (b) and (c) after some reporting authorities had expressed concerns that they would have to back track and re-do parts of the report if the report on the impact of climate change and programme for adaptation to climate change came into force during the reporting process. In reality, (b) refers to the UK's first Climate Change Risk Assessment and (c) refers to the National Adaptation Programme neither of which will be published until 2012, after this round of reporting has ended (November 2011). To avoid any confusion, and to take reporting authorities' concerns on board, we have removed points (b) and (c).

2. Devolution and Coverage of the Direction

The Secretary of State has the power to issue Guidance and Directions to reporting authorities in Wales, Scotland and Northern Ireland, in relation to their non-devolved functions. Where appropriate we have consulted or sought consent from the government of devolved administrations as required by section 64 of the Climate Change Act 2008 and this has been given. The Direction does not apply in respect of any devolved functions of your organisation. The Direction does not apply in respect of any activities of the reporting authority which are: (i) outside of the United Kingdom; and (ii) which do not relate to any of its functions within the UK that are of a public nature or are part of its role as a statutory undertaker.

3. Deadlines

While some water companies stated that they would be able to meet our proposed deadline of 30 November 2010, other organisations felt that they would need longer to produce the reports. Therefore to take on board these concerns, we have decided to move the deadlines for all water companies' reports to **31 January 2011**.

4. Submitting the report

The deadline specified in your Direction is the deadline for submitting your report to the Secretary of State. From this date, there will be a period of 3 months after which the Secretary of State will comment on the fitness for purpose of the report. If we have judged that you have not had sufficient regard for the Statutory Guidance or fulfilled the requirements of the Direction, then you may be asked to re-do some parts of the report. You will then have 3 months to take on board comments and submit a final report to the Secretary of State. In reality therefore, if your deadline is 31 January 2011, your report may not be made publically available until August 2011.

5. Security and Confidentiality

We would like to reiterate that we understand that some information in your report may be sensitive for commercial or security reasons. However, the Government is committed to putting as much information as possible into the public domain, and is legally obliged to publish the full report except for information which can be withheld in accordance with the exceptions in the Freedom of Information Act 2000 (and related regulations) including the Environmental Information Regulations 2004, or for which disclosure is prohibited by another piece of legislation. **We would therefore ask you to mark any information that you think should not be published, and submit a second, redacted version alongside the complete report.** The Secretary of State will confirm that your redacted report complies with these regulations within 3 months of being submitted. If not, you may be required to re-submit your report.

6. Evaluation of the reports

An external risk expert institute, the Cranfield University Risk Centre, will analyse the quality of the risk assessment in each report and also produce sector summaries of the risks. Policy judgements on the basis of the reports remain the responsibility of individual government departments. The adaptation measures in the reports will be looked at by the Adapting to Climate Change Programme and officials in each relevant government department, so reports from the water sector will be examined by policy leads in Defra. They will also take responsibility for analysing and considering any actions arising from the reports for their sectors.

The combination of Cranfield's experience and departments' views will constitute the Secretary of State's response to the fitness of your report. The Adapting to Climate Change Programme alongside relevant government departments will then develop a cross sectoral summary of all the reports.

7. Statutory Guidance

Reporting authorities are required by section 63(3) of the Climate Change Act 2008 to have regard to Statutory Guidance when producing their reports. The Statutory Guidance was published on the 26 November 2009, and can be downloaded from our website at the following link: <http://www.defra.gov.uk/environment/climate/documents/statutory-guidance.pdf>. For more information on how to use the Statutory Guidance, please see our 'FAQs' which have been published on Defra's website¹. The Statutory Guidance we have published will help you to understand what we require in a report and provide you with information on approaches to risk assessment and developing action.

¹ <http://www.defra.gov.uk/environment/climate/legislation/reporting.htm>

8. Environment Agency's Supplementary Guidance

While all reporting authorities welcomed the Environment Agency's Supplementary Guidance as an additional source of information, many requested more clarity on its level of detail and publication date. I can therefore confirm that the 'supplementary guidance' will be published on the Environment Agency's website in March 2010, which should give reporting authorities ample time to utilise it when producing their reports. It is intended to complement the Government's Statutory Guidance, but it should be noted that, **unlike the Statutory Guidance, reporting authorities are not obliged to have regard to it.**

The Environment Agency has significant expertise in planning for climate change and its guidance will make it easier to find out what the Environment Agency can and cannot provide. It signposts data, advice and tools for assessing climate risks in core Environment Agency areas, such as flood risk, coastal erosion and water resources. It also explains where the Environment Agency may be able to offer further support.

9. The role of Ofwat

Ofwat has also been identified as a priority reporting authority and will be asked to report on how it considers climate change will affect its ability to fulfil its functions, and what action it proposes to take on this.

The Statutory Guidance makes it clear that we expect regulatory reporting authorities to outline how their framework could provide incentives for effective adaptation. This might be through addressing market failures, most commonly by amending existing, or creating new, instruments to account for climate risk and adaptation.

Regulators will be reporting **after** those that they regulate, so that they can take into account their sector's risks and plans for adapting in their reports. We propose to share your report with Ofwat before it is made publically available for this purpose. Ofwat will not have a formal role in assessing the quality of the water sector's reports in this round but we feel it should be aware of the key messages before producing its own report. Ofwat will then want to work with Defra to consider the wider actions that may need to be taken as a result of the information gathered from the sector. Ofwat's report will also provide vital information on action which may be needed by Government to break down regulatory barriers to adaptation.

10. Report on adapting infrastructure in the energy, water and transport sectors to the long term impacts of climate change.

A two-year (to March 2011) cross-departmental Infrastructure and Adaptation project has been set-up to identify and examine strategic solutions to improve the long-term resilience of new and existing infrastructure in the energy, telecommunications, transport and water sectors to future climate change impacts. The project's first output, a study on the technical and operational risks from climate change on infrastructure in the energy,

transport and water sectors is currently being finalised and will be made publicly available. This will be sent to you on its completion, expected to be in March. It will also be made available via a new 'infrastructure section' on the Defra Adaptation website.

11. Data Gaps

In the letters and draft Directions we sent to you in December, we asked if you felt there were any gaps in the data available to you which compromised your ability to produce comprehensive reports. Some organisations identified gaps in the data around wind, snow and ice, lightning activity, flood depth (for causes other than fluvial and tidal).

Thank you for this information which is extremely useful in our continued prioritisation of our evidence strategy. We have taken these comments on board, and in particular with reference to work that we are requesting from the Met Office to enhance the current UK Climate Projections through investigating ways in which projections of wind and snow might be provided. The Met Office is also planning the publication of a technical note on lightning. The work on these issues will be carried out throughout 2010 and we will keep reporting authorities updated on its progress.

12. The UK's first Climate Change Risk Assessment

We would like to take this opportunity to inform you that under the Climate Change Act 2008, Defra is required to conduct a Climate Change Risk Assessment (CCRA) for the UK to lay before Parliament by 26 January 2012. I attach a summary of the risk assessment method (which is currently being piloted and so may be refined). This does not affect your requirement to report under the Adaptation Reporting Power or the Statutory Guidance to reporting authorities.

For your information the HR Wallingford-led consortium who are helping Defra undertake the CCRA are carrying out the pilot study in the water sector to test the risk assessment methodology. This involves a series of steps to understand the potential consequences of climate change. The scale of assessment is regional, so while data may be collected at a finer scale, such as water resources zones, results will ultimately be presented for Devolved Administrations and English Regions.

The pilot analysis will be based primarily on existing evidence including published water company plans, Environment Agency studies and the research literature. However the pilot would be greatly improved by collecting a small amount of additional information that underpins the current draft Water Resources Management Plans. This should be existing information and you will not be required to undertake any further analysis for the pilot. South East Water Ltd may be approached by HR Wallingford during the next two months and we would appreciate your help at this important stage.

13. Support

We have recently published a 'Frequently Asked Questions and Answers' pack on our website². There is no statutory requirement for any reporting authority to have regard to our answers but we hope that they will provide clarity over: the reporting process, how to use the Statutory Guidance, scientific evidence, and what will happen to the reports. If reporting authorities feel there are omissions to the pack, please let the Adapting to Climate Change Programme know³ so that we can keep it as an up to date source of information.

We look forward to working closely with your organisation throughout the development of its report. If you would like to discuss this further please contact Sally Belfield (Sally.Belfield@defra.gsi.gov.uk 0207 238 4570) or Helena Busby (Helena.Busby@defra.gsi.gov.uk).

Please confirm receipt of the Direction by sending an email to acc_reportingpower@defra.gsi.gov.uk.

I am copying this letter to Ofwat, and WaterUK.

Yours sincerely,

Clare Hawley
Adapting to Climate Change Programme
Department for Environment, Food and Rural Affairs

² <http://www.defra.gov.uk/environment/climate/legislation/reporting.htm>

³ Please send an email to: acc_reportingpower@defra.gsi.gov.uk

Direction

Climate Change Adaptation Report by South East Water Ltd Direction 2010

The Secretary of State has been conferred powers by section 62(1) of the Climate Change Act 2008 to direct certain persons or bodies known as "reporting authorities"¹ to give reports about adaptation to climate change.

He makes the following Direction to South East Water Ltd under the powers conferred by that section:

Citation and Commencement

1. This Direction may be cited as the Climate Change Adaptation Report by South East Water Ltd Direction 2010. It has immediate effect.

Interpretation

2. -In this Direction-
"the reporting authority" means South East Water Ltd

Direction

3. The reporting authority must prepare and send to the Secretary of State a report containing:
 - (a) an assessment of the current and predicted impact of climate change in relation to the reporting authority's functions;
 - (b) a statement of the reporting authority's proposals and policies for adapting to climate change in the exercise of its functions and the time-scales for introducing those proposals and policies.
4. The assessment of impact referred to in paragraph 3(a) must include:
 - (a) a summary of the statutory and other functions of the reporting authority;
 - (b) the methodology used to assess the current and predicted impacts of climate change in relation to those functions; and
 - (c) the findings of the assessment of the current and predicted impact of climate change in relation to those functions.
5. This report must be prepared by **31 January 2011**.

¹ See the definition of "reporting authority" in section 70 of the Act.

Representations as to information that should not be published.

6. The reporting authority must, in its report, make representations as to any information in its report which it considers should not be published. Representations must demonstrate that this information is information that the Secretary of State is not obliged to publish on the basis that it meets one of the exemptions in section 63 (7) of the Climate Change Act 2008, namely:
 - (a) that it is information which the Secretary of State could refuse to disclose in response to a request under the Freedom of Information Act 2000, or the Environmental Information Regulations 2004 (SI 2004/3391) or any regulations replacing those regulations; or
 - (b) that it is information whose disclosure is prohibited by any enactment.

Signed by Authority of the Secretary of State,

Clare Hawley
A Senior Civil Servant in the
Department for Environment, Food and Rural Affairs

Explanatory Note

(This note is not part of the Direction)

This Direction requires the reporting authority to prepare a report about the impact of climate change on the reporting authority's functions and policies, and its proposals for adaptation. The reporting authority is required by section 63(5) of the Climate Change Act 2008 to send a copy of the report to the Secretary of State to publish. This report must be sent as soon after preparation as is reasonable.

This Direction does not apply in respect of any devolved functions of the reporting authority.

This Direction does not apply in respect of any activities of the reporting authority which are: (i) outside of the United Kingdom; and (ii) which do not relate to any of its functions within the UK that are of a public nature or are part of its role as a statutory undertaker.

In preparing the report, the reporting authority is required by section 63(3) of the Climate Change Act 2008 to have regard to:

- (a) the guidance issued by the Secretary of State under section 61 of the Climate Change Act 2008.

If the time between the issuing of any of the guidance or reports and the deadline for the report is very limited then it may be unreasonable to expect the guidance or reports to be taken into account. If so, the reporting authority should note that the requirement in section 63(3) of that Act to take these reports and guidance into account is qualified by the words "so far as relevant".

In preparing the report, if the reporting authority has functions that are exercisable in or as regards Wales or has devolved Welsh functions, then by section 63(4) of the Climate Change Act 2008 it must have regard so far as relevant to any guidance issued by the Welsh Ministers under section 66 of that Act and the most recent report under section 80 of that Act.

The reporting authority is required by section 63 (8) of the Climate Change Act 2008 to have regard to the report in exercising functions other than its devolved functions.

Compliance with this Direction is a statutory obligation (section 63(1) Climate Change Act 2008).

Appendix B: Defra direction letter for second round of reporting



Department
for Environment
Food & Rural Affairs

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Ms Jo Stimpson
Financial Director
South East Water Ltd

17 December 2013

From Dan Rogerson
Parliamentary Under Secretary of State for Water, Forestry, Rural Affairs and Resource
Management

Dear Jo

ADAPTING TO CLIMATE CHANGE: ENSURING PROGRESS IN KEY SECTORS

I am writing to introduce myself as the minister now responsible for climate change adaptation. As such, I am keen to learn how, through the second round of voluntary adaptation reporting, providers of services critical for the running of this country and the health of our natural environment are preparing to respond to a changing climate.

This July, under the Climate Change Act 2008, my department laid before Parliament a report called '2013 Strategy for exercising the Adaptation Reporting Power and list of priority reporting authorities'. This sets out how government will use the Adaptation Reporting Power over the next few years. The Strategy sets out that a voluntary approach to reporting will be implemented for the second round instead of issuing a statutory direction. This approach reflects the overwhelming support for a voluntary approach during consultation, and will ensure reporting is flexible and responsive to the needs and circumstances of the different sectors, while minimising burdens.

Reporting will help government understand the level of capacity to adapt in the sector. The information provided will also importantly inform the next Climate Change Risk Assessment which will be published in 2017 and the update of the National Adaptation Programme thereafter.

Guidance, which is aimed to help organisations produce an update to their first round report, is attached with this letter. It has been developed drawing on feedback given by reporting organisations and our analysis of first round reports. Also attached is updated voluntary guidance aimed at new reporting organisations which you may find of use too. In line with our overall approach, use of both documents is completely voluntary and can be used flexibly, as much as is needed or appropriate.

We are committed to placing as much information as possible into the public domain, and we would wish to publish your full report in due course. I do, however, appreciate that some information in your report may be sensitive for commercial or security reasons. Such information can be withheld in accordance with the exceptions in the Freedom of



INVESTORS
IN PEOPLE

Information Act 2000 and related regulations, including the Environmental Information Regulations 2004, or for which disclosure is prohibited by another enactment. I would therefore ask you to mark any information that you think should not be published, and submit a second, redacted version alongside the complete report. We will confirm that your redacted report complies with these regulations within 3 months of being submitted.

Based on the feedback received from our consultation process, the Environment Agency's Climate Ready Support Service will be providing help to reporting organisations. They are hosting an initial workshop in London on Tuesday 14th January, to which your organisation has already been invited. If you have not already, please book your place via <http://bookwhen.com/climateready>

As recent weather events demonstrate, anticipating and building resilience to the impacts of a changing climate and the associated weather extremes is crucial to safeguard growth and protect communities and businesses. I therefore invite you to provide an adaptation progress update on your first round report, particularly on how your understanding of climate change implications has developed and what actions have been implemented to address these risks.

I would be grateful if you could acknowledge receipt of this letter with confirmation that your organisation will participate in this reporting round, to acc_reportingpower@defra.gsi.gov.uk. It would also be greatly appreciated if you could inform us as to when you plan to report.

I very much hope you will participate in this voluntary process and I look forward to learning about the progress you have made since your first round report.

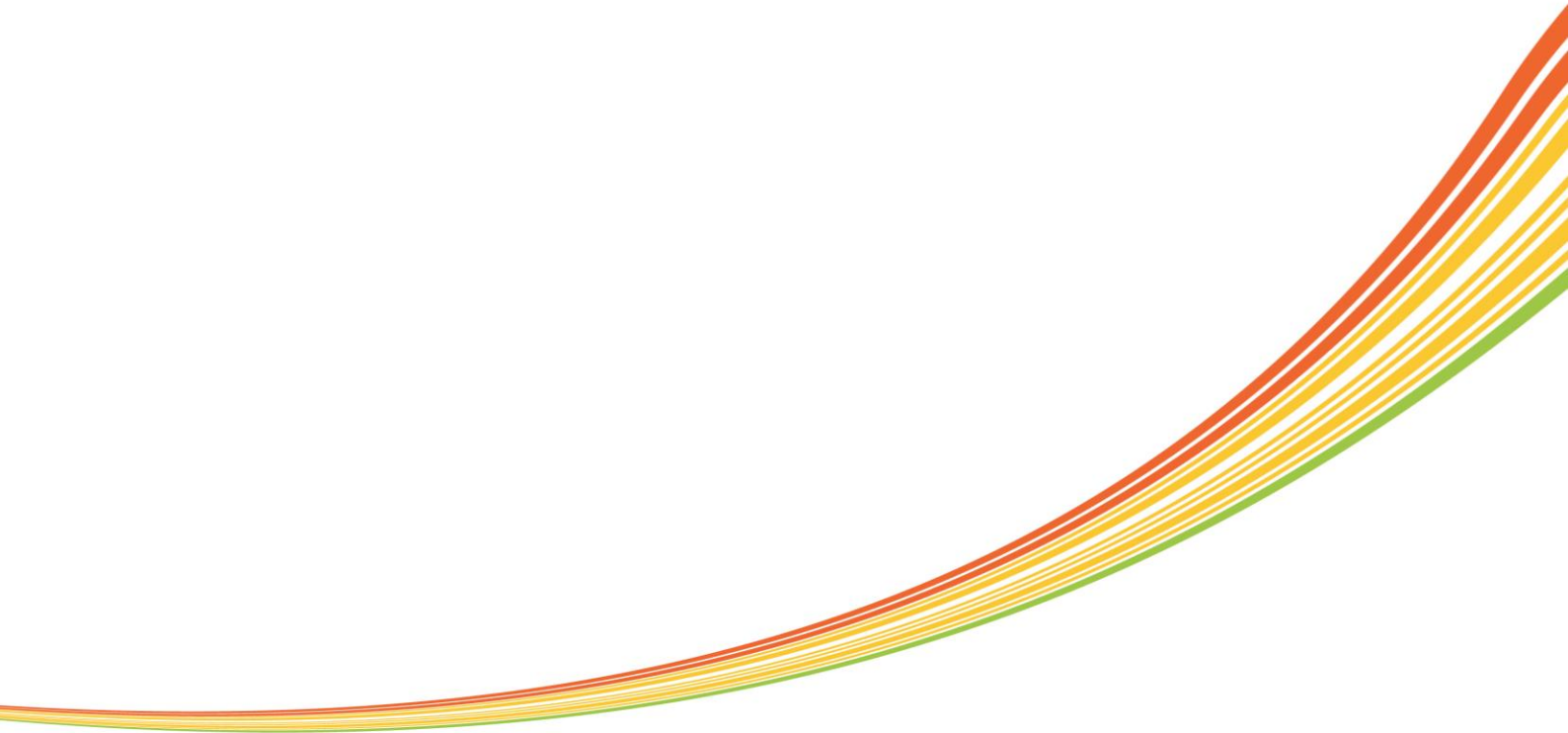
Yours sincerely



DAN ROGERSON MP



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