



Comprehensive Risk Assessment and priority adaptation actions (NI 188)

For Cherwell District Council

Final Report to Cherwell District Council

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Issue 1


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Executive Summary

In 2008 climate change impacts and adaptation became firmly embedded in local government with the introduction of the Government's new set of 198 performance indicators for local authorities. For the first time, this included indicators on climate change, one of which was adaptation.

Adaptation is about ensuring Cherwell District Council's services, assets and functions are *resilient* to the realities of a changing climate.

Local authorities **are now expected to understand the risks presented by climate change** in terms of the likely impacts upon, and the vulnerabilities of, **the services that they deliver**. This understanding must be translated into proactive actions to ensure resilience in the face of climate change and demonstrate to the community and auditors that everything necessary is being done.

Cherwell District Council has made a public commitment to **“assess the risk associated with climate change and the implications for our services and communities of climate change impacts and adapt accordingly”**¹ and, as a key partner in the Cherwell Local Strategic Partnership, has acknowledged its responsibility to **“take a robust approach and adapt to these climate and environmental changes as they occur.”**² This report on climate risks provides a starting point to help fulfil these commitments.

The main objectives of this report were to:

- Assess projected climate change for Cherwell using the latest set of UK Climate projections (UKCP09)
- Identify future climate change impacts for the Council and community using available evidence, research and our professional experience
- Assess risks using the method currently employed by the Council, and identify priorities for action.

Through the risk and opportunities assessment, potential consequences to the District Council from climate change, both harmful and beneficial, have been explored. Our analysis has focused on three tiers: strategic, corporate and service. Key findings are:

- In tier one – **Strategic**, we focused on the risks to the wider community via the Local Strategic Partnership. All the objectives in the 2020s and 2050s have a low or medium risk (see Table 1.) There are two objectives at very high risk by the 2080s:
 1. *‘Manage our infrastructure development, matching housing growth with local jobs, transport to work, facilities and services. We will plan effectively for our future workforce and employment patterns, focusing on what we need to achieve in raising our skills and actively attracting the right businesses into the area’*. See section 5.1.1
 2. *“Ensure our social infrastructure grows at the same rate as our communities and current deficiencies in provision are addressed including affordable housing, community buildings, open spaces, cultural and leisure opportunities”*. See section 5.3.1

¹ From the Nottingham Declaration on Climate Change: <http://www.energysavingtrust.org.uk/nottingham/Nottingham-Declaration/The-Declaration/About-the-Declaration>. Cherwell District Council signed the Declaration in 2007.

² From ‘Our District, our future. Cherwell Sustainable Community Strategy’.

- In tier two – **Corporate**, we focused on Cherwell District Councils own estate through the Corporate Plan and Improvement Strategy. All the targets are at low or medium risk in the 2020s and 2050s (see Table 2). There are three targets at very high risk by the 2080s:
 1. *“Complete an employment land assessment and include provision of at least two major new business sites in the Local Development Framework – LDF”* See section 6.1.
 2. *“Start construction on Bicester Town Centre Development”* See section 6.2
 3. *“Achieve an annual average rate of new homes constructed of 600, of which 100 are affordable”* See section 6.3
- In tier three – **Services**, we focused on services and functions provided by Cherwell District Council based on the Environmental Service Plan and key delegated powers from the Constitution. In the 2020s and 2050s all objectives are low or medium risk. By the 2080s there are three objectives at high risk and these are:
 1. *“The management of all Council community facilities”*. See section 7.1
 2. *“The planting and maintenance of trees on Council-owned land or Council controlled land”*. See section 7.2
 3. *“Engage residents and businesses to reduce emissions across the district”*. See section 7.3
- In the short-term (2020s) many of the risks from climate change are considered low. In many cases existing contingency planning and risk management will help the Council to cope with the consequences of extreme weather events. There will also be opportunities for the Council in the short-term, although realising these may be difficult and any cost savings indirect.
- In the longer term (2050s and 2080s) the risks increase substantially both in terms of likelihood and magnitude. Climate projections (UKCP09) suggest that Cherwell’s climate will be very different in the future and change considerably from what residents, local businesses and the Council are used to. This might include summers that are warmer and drier, winters that are milder and wetter, more very hot days and nights, more intense downpours of rain and possible increases in storms. All will lead to knock-on impacts. This means that the Council will find it increasingly difficult to ‘cope’ in the way it has done in the past. Opportunities will increasingly be outweighed by negative costs.

Decisions made now will have consequences for how the Council, and more importantly the community, operate, work and live in the future and so must take due consideration of climate change. The Council will already be addressing many of the risks identified in this assessment, although perhaps not with the necessary longer-term perspective. Basing planning decisions on the assumption that Cherwell’s past climate will be the same as its future climate is no longer valid.

Next Steps

We recommend that the following steps are taken:

- **Review** the findings internally and revise where necessary
- **Embed** climate risk within Council planning
- This will help provide material and structure for an **adaptation action plan**.

We have provided the next steps to progress this work for the following staff and the actions list is provided in Section 9.2:

- Environmental Services team
- service area managers and
- senior management.

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1 Introduction

Climate change is now widely acknowledged as an important issue for local authorities to consider as they plan and deliver services for the communities they serve. As community leaders local authorities are in a position of responsibility to respond to climate change and there are also increasingly strong statutory drivers from central government that will force even the most sceptical authority to seriously consider climate change.

There are two primary responses to climate change:

Mitigation is about avoiding the impacts of climate change, by reducing greenhouse gas emissions (**limits future climate change**)

Adaptation is about responding to the future impacts of climate change, such as increased flood or drought risk (**reducing damages**)

Mitigation is a proactive, long term action that will have direct cost savings for a local authority while helping meet UK targets for greenhouse gas reduction. **Adaptation** is about preparing for change; ensuring processes, policies and strategies are developed to take account of climate change risks to strategic and corporate objectives.

Irrespective of the belief within a Council regarding the causes of climate change it is important to recognise that central and regional government now requires action across a range of different policy and service areas. Local authorities must demonstrate that they are taking account of climate change in an appropriate and satisfactory manner as climate change is increasingly becoming an issue of performance.

The Department for Environment, Food and Rural Affairs (Defra) is leading the formulation and implementation of adaptation policy in the UK, although the focus of delivery will be at regional and local levels. Consequently, regional strategies, and local policies and plans are vital in shaping the nature and extent of adaptation actions at the local level and this places considerable emphasis on local authorities and Local Strategic Partnerships (LSP).

The Climate Change Act (2008) set the statutory framework for UK action on adaptation, and introduced a number of legislative requirements. However, the most important and direct manifestation of central governments concern regarding the role of local authorities in helping the UK adapt to climate change is through National Indicator 188 ('Planning to adapt to climate change').

1.1 Context: National Indicator 188

National Indicator 188 is a new indicator for a relatively new policy area. NI 188 is a 'process-based' indicator, in contrast to the majority of national indicators, which are designed to measure outcomes. NI 188 recognises that understanding of the adaptation agenda is not yet sufficient to specify outcomes, that climate impacts are local, and that it is currently impossible to have a generic outcome indicator which is applicable to all sectors and all parts of the country. The emphasis is very much on progress at understanding risks and ensuring the means of responding appropriately is embedded across council planning at all levels.

There are five levels to NI 188:

- Level 0 Getting started
- Level 1 Public commitment and impacts assessment
- Level 2 Comprehensive risk assessment
- Level 3 Comprehensive action plan
- Level 4 Implementation, monitoring and continuous review

During the first period of the indicators (2008 / 2009) Cherwell District Council reported itself as having achieved level 1. The main output from the level 1 work was the development of a Local Climate Impact Profile (LCLIP) in February 2009 which was subsequently built on by a stock-take of existing plans and policies in December 2009. Cherwell District Council is a signatory of the Nottingham Declaration on Climate Change, and has therefore made a public commitment to identify and manage climate related risk.

For Cherwell District Council's service areas, the LCLIP identified weather-related impacts and a number of vulnerabilities. The stock-take exercise considered the extent to which climate change adaptation was addressed in a number of key strategic documents from different service areas (health, waste, environment, housing, etc). The review found that although there did exist within the Council an awareness of potential climate impacts and the need for adaptation actions, this awareness was not evenly distributed across departments, with some much more aware than others.

To achieve level 2 of NI 188, local authorities must provide sufficient evidence to demonstrate they have:

1. **Undertaken a comprehensive risk based assessment of vulnerabilities** to weather and climate, both now and in the future
2. **Identified priority risks for council services** *(and informed executive or senior management)*
3. **Identified the most effective adaptive responses** *(e.g. Documents and agreements in place approved by departmental directors which identify adaptive responses for the priority risks for their department's functions)*
4. **Started to incorporate adaptive responses into council strategies, plans, partnerships** and operations *(e.g. Adaptive responses for priority risks have been incorporated into one or more departmental strategies, plans, partnerships and operations)*
5. **Begun implementing appropriate adaptive responses in some priority areas** *(Council or departmental performance management reports record implementation of some adaptive responses for priority risks)*
6. **Encouraged the LSP to identify major weather and climate vulnerabilities and opportunities** that affect the delivery of the LSP's objectives. *(e.g. Encouraged LSP to identify major weather and climate vulnerabilities by: distributing written information to partners; and/or contributions at meetings; and/or holding workshops; and/or forming adaptation sub-group)³*

This report provides evidence to support Cherwell District Council's submission to reach level 2 of NI 188. This report contains:

- A detailed picture of what future climate change might look like for Cherwell based on the UK's latest set of climate projections (UKCP09). *This is a necessary step to help identify what the future impacts of climate change might be for Cherwell District Council and the community*

³ Taken from Self Assessment guidance and matrix for National Indicator NI 188 - Planning to adapt to climate change (v.1.0 April 2009)

- A comprehensive risk assessment for Cherwell District Council based on three tiers (strategic, corporate and service area) for three time periods. The risk assessment also identified priority risks for the Council. *These will provide a resource for the Council and evidence for criteria 1 and 2 above.*
- Identification of priority adaptation actions, both for the specific risks identified at the strategic, corporate and service level, and in more general terms in relation to level 3 of NI 188

A glossary of key terms is also provided in the appendix (1).

1.2 Structure of this report

Following the introduction (section 1) this report presents the projected climate change findings for Cherwell (section 2), outlines the approach taken (section 3) and possible impacts from climate change (section 4). Sections 5 to 7 discuss the risks and opportunities from climate change and potential adaptation actions. Section 8 provides a discussion on what the risks mean. Section 9 discusses next steps in relation to NI 188 and section 10 concludes the report.

Full technical details from the UK climate projections (UKCP09), the impacts and risk assessments can be found in the separate appendices.

2 Climate Change Projections for Cherwell

Climate change impacts will primarily be experienced as weather events and these have the potential to disrupt key functions and services delivered by the Council both now and in the future.

To better prepare and respond to these impacts it is necessary to try and understand what the changes in our climate will be and how this will affect the Council. A key means of exploring climate is through projections of future change.

The UK Climate Projections (UKCP09) are the fifth generation of climate information for the UK funded by Defra and facilitated by UK Climate Impacts Programme. It is the most comprehensive package produced to date and the first time it provides projections of future climate based on the known sources of uncertainty in climate modeling.

The first step in developing climate projections is to develop a range of emissions scenarios. These are 'storylines' of how our world will develop in the future including population, energy use etc., to explore what our emissions of greenhouse gases might be in the future depending on the choices society makes. They all assume no political intervention and are based on different assumptions about future socio-economic changes.

There are three emissions scenarios in UKCP09: low, medium and high. For this report we have used the 'low' and 'high' scenarios. Timeslices, periods of 30 years over which climate averages are calculated, allow investigation of the different emission scenarios and subsequent climate changes over time. For this report we have focused on the 2020s (2010 to 2039) for the short term, the 2050s (2040 to 2069) as the medium term and finally the 2080s (2070 to 2099) for the long term picture. This is consistent with guidance on using the scenarios.

These projections of UK climate give an indication of the relative strength of scientific evidence supporting the picture of future climate portrayed by the different scenarios. They are presented probabilistically. The central estimate value for any of the climate variables shows change that has a 50% probability of being exceeded, and a 50% probability of being lower than the figure provided. The 50% means that any given change is 'as likely as not' to happen. The extreme indicators, the 10% and 90% probability, show values that are unlikely to be less than (10%) or unlikely to be greater than (90%).

This section provides headline climate change messages for Cherwell District Council taken from the new UK climate projections (UKCP09). Further details, including the grid square chosen and projected changes in a wider range of key variables are included in the appendix (2) of this report.

The **2020s** covers the years 2010 to 2039

The **2050s** covers the years 2040 to 2069

The **2080s** covers the years 2070 to 2099

Headline Climate Change**Cherwell Baseline (1961-1990) Climate*****Temperature***

Cherwell has temperate annual, summer and winter temperatures.

- **Annual average temperature** in Cherwell is **9°C**.
- Daily **minimum temperatures in winter** are **1°C** on average.
- Daily **maximum temperatures** in summer are **20°C** on average.

Rainfall and snow

Cherwell's rainfall and snow is evenly distributed throughout the year.

- **Annual average rainfall** is **2mm/day**.
- **Summer rainfall** is **2mm/day** on average.
- **Winter rainfall** or snow is **2mm/day** on average.

These figures are taken from the Met Office 1961-1990 observed long term data for UKCP09 (25 km gridded observation data – see appendix 2, Table 13).

Cherwell in the 2020s***Temperature***

Cherwell is getting warmer and is experiencing increasingly variable seasonal temperatures.

- **Change in mean annual average temperature** suggests that there will be **1 °C warming**, but warming **could be** as much as **2 °C**.
- **Summer** mean daily **maximum temperatures** show an **increase** from **20 °C to 22 °C**, but they could **reach 23 °C** in an **extremely hot summer**.
- The **warmest day in summer** is expected to increase by at least **1°C** but this may **increase further to 7°C** at the extreme.
- The temperature on the **warmest night in summer** is also expected to **increase by 1 °C**, but it **may increase by up to 3°C** in an **extremely hot summer**.

Rainfall and snow

Cherwell will experience similar or slightly greater annual rainfall or snow with greater variability in summer rainfall than in winter rainfall or snow.

- **Summer rainfall** shows much **more variability within the season** and could **reduce by** as much as **17 %** or **potentially increase by** up to **23 %**, **at the**

extremes.

- **Annual average rainfall or snow** shows **minimal change** by the 2020s.
- Rainfall (or snow) on the **wettest day in winter** may decrease by **9 %**, with the potential to **increase by 27 % at the extreme**.

These figures are taken from the UK climate projections (see appendix 2, Table 14)

Cherwell in the 2050s***Temperature***

Cherwell is getting hotter, especially in summer, and is experiencing increasingly variable seasonal temperatures.

- **Change in annual average temperature** suggests that there will be **1°C warming**, but warming **could be as much as 4°C**.
- **Summer** mean daily **maximum temperatures** show an **increase** from **20°C to 23°C**, but they could **reach 27°C** in an extremely hot summer.
- The **warmest day in summer** is expected to increase by at least **3°C**, but this may increase further to **9°C** at the extreme.
- The temperature on the **warmest night in summer** is also expected to **increase by 2°C** but **may increase by up to 5°C in an extremely hot summer**.

Rainfall and snow

Cherwell will experience similar of slightly wetter annual rainfall or snow with greater variability in winter rainfall or snow than in summer rainfall.

- **Summer rainfall** could **reduce by as much as 25%** or **potentially increase by up to 20% at the extremes**.
- **Annual average rainfall or snow** shows **minimal change** by the 2050s.
- Winter rainfall (or snow) shows **much more variability within the season**, and **could reduce by 4%**, or **potentially increase by up to 40%** at the extreme.

These figures are taken from the UK climate projections (see appendix 2, Table 14)

Cherwell in the 2080s***Temperature***

Cherwell is getting extremely hot, especially the warmest days in summer.

- **Change in annual average temperature** suggests that there will be **3°C warming**, but warming **could be as much as 6°C**.
- **Summer** mean daily **maximum temperatures** show an increase from **20°C to 24°C**, but they could reach **30°C** in an extremely hot summer.
- The **warmest day in summer** is expected to increase by at least **3°C**, but this may increase further to **12°C** at the extreme.
- The temperature on the **warmest night in summer** is also expected to **increase by 2°C** but may increase by up to **8°C in an extremely hot summer**.

Rainfall and snow

Cherwell will experience similar or greater annual rainfall or snow with large variability in the seasons, especially in winter.

- **At the extremes, summer rainfall** could **decline further by** as much as **32%** or potentially **increase by** up to **18%**.
- **Annual average rainfall** or **snow** shows **minimal change** by the 2080s, but could increase by 9%.
- **The wettest days** in winter may have 1% less **rainfall or snow in winter, with the potential to increase by 62% at the extreme.**

These figures are taken from the UK climate projections (see appendix 2, Table 14)

The findings above provide a useful starting point for thinking about how the climate in Cherwell will change and what consequences, both as threats and opportunities, this will bring.

UKCP09 is still very new and provides considerably more information in a greater variety of formats than the previous set of climate projections, published in 2002 (UKCIP02). There is potentially more that the District Council could do with the material available through the User Interface (a dedicated web portal for customising output from the scenarios).

2.1 Using UKCP09

There are a number of qualifications to using the projections:

- The sheer volume of material requires users to have a clear purpose in mind and to have given careful thought about how to use and present the information. The development of case studies and sector specific worked examples is planned by the Department for the Environment, Food and Rural Affairs (Defra) and the UK Climate Impacts Programme (UKCIP) and will also help with understanding the potential for the scenarios to aid decision-making.
- Different types of decision require different types of information and with UKCP09 it is important to select the right output from the many available.
- The fact that the results are presented probabilistically presents opportunities for users to explore the expected direction and extent of change in greater detail. However, many people find interpreting and using probabilities difficult. Understanding what the results are telling you is a challenge and requires particular care in communication.
- While the projections provide an idea on how climate may change they do not directly outline what the impacts might be (such as drought or flooding) or how risks may change.
- The projections cannot exactly predict the future climate of the UK - partly because we cannot be certain how emission levels will change, and also because no climate model can give a perfect representation of the climate.⁴

⁴ See: <http://www.lga.gov.uk/lga/aio/7904638>

3 Approach

The focus of this risk assessment is on the District Councils services and functions at three different tiers,

- Tier 1 : Strategic,
- Tier 2 : Corporate,
- Tier 3 : Service areas outlined below.



This was based on the assumptions that:

- To fully cover the risks to the Council it is necessary to look at direct risks to services (such as an increased risk of flooding to leisure services) and indirect risks from the Councils role as community leader (such as reputation and ‘creeping’ costs to the Council itself)
- As a District Council, Cherwell is reliant on other delivery bodies to support many of its services
- There is a need to link the day-to-day services provided (against a context of short-term annual service planning) with a longer term vision for the community and the Councils role.

Ultimately the aim was to be able to trace wider risks to the community to the work of the Council and hence demonstrate where the priority areas for action should be.

3.1 Strategic

To consider implications from climate change risks to the wider community we identified the first tier of our analysis as being the strategic level. For the purpose of this project strategic means the Local Strategic Partnership, the key priorities of which are formalised in the **Cherwell Sustainable Community Strategy** (2009 to 2014). This identifies a vision for the community of:

“A diverse economy with opportunities for all, vibrant communities connected by a sense of pride, place and purpose”.

In particular a number of aspirations are made for Cherwell in 2030. These include:

- Cherwell will be more prosperous
- Those who live and work here will be happier, healthier and feel safer
- Everyone will share in a better quality of life.
- Older people will lead independent and healthy lives with access to excellent services.
- Young people will have high personal aspirations, satisfied by a wide variety of local opportunities to achieve appropriate skills, qualifications and jobs.
- The quality of our natural and built environment will be cherished and our resources protected.
- We will embrace environmental technologies and adapt our behaviour to meet the global challenge of climate change.



To help achieve these aspirations four pledges are identified: Economic, Community, Infrastructure and Environment, Leadership⁵.

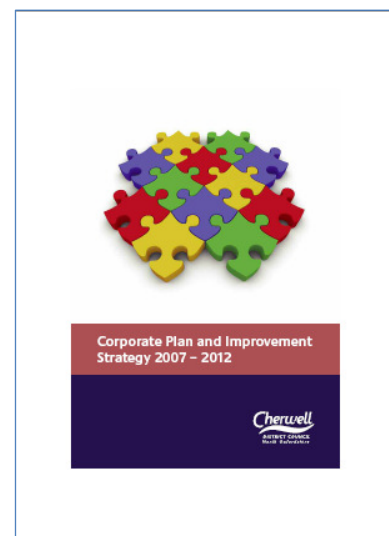
Each pledge has an associated number of activities, the full list can be found in appendix 3, Table 16. We focused our analysis on the pledges, rather than the activities. So for example, the Community aspiration has five pledges and between three and four activities per pledge.

3.2 Corporate

The second level of our analysis flows from the strategic level and focuses on the District Councils overarching role in helping deliver both the pledges identified above but also the objectives identified in the Corporate Plan and Improvement Strategy (2007 to 2012). This document describes corporate aims and objectives. The corporate priorities are:

1. Cherwell: a district of opportunity
2. A safe and healthy Cherwell
3. A cleaner, greener Cherwell
4. Cherwell: An accessible, value for money Council

Each priority has a number of aims and associated targets. The full list can be found in appendix 3, table 17.



⁵ For full pledge and strategy see: http://www.cherwell.gov.uk/media/pdf/s/t/Sustainable_Community_Strategy.pdf

3.3 Services

The third tier of assessment was in terms of services and functions provided by Cherwell District Council. We developed a list of key services in consultation with Council staff and after reviewing Cherwell District Council's constitution which outlines important delegated powers to service areas.⁶ We also focused directly on the Environment and Community Directorate (Environmental Services) for an in-depth analysis of risks at a service level. The full list of delegated powers by service area and the draft service profile for the Environment and Community service area can be found in the appendix 3, Tables 18 and 19.

Further work at the service level is being conducted through a series of working sessions with heads of service areas across the Council. A sample briefing note can be found in appendix 7.)

3.4 Method

3.4.1 Stage One

The first stage of our approach was to identify a number of key 'events' from the analysis of UKCP09 (see section 2). While the projections focus on discrete variables, such as change in daily maximum summer temperature, we used a combination of variables to identify a number of 'events'. This we categorised as:

- **Warmer, drier summers**
- **Milder, wetter winters**
- **More very hot days and nights**
- **More intense downpours of rain**
- **Possible increase in storms (high winds)**

These are consistent with the means of identifying impacts used in other reference sources.⁷ This covers both the gradual, monotonic seasonal and annual changes and the more intense, short-lived extreme events. All the information on these events was extracted from UKCP09 with one exception. There are no probabilistic projections available for the possible increases in storms and wind because the relevant data was not available from other modelling centres.⁸ For the purpose of this project we drew on UKCIP02.

3.4.2 Stage Two

The second stage was to identify whether the climate events represented a threat or an opportunity to the District Council. So for example, Do milder, wetter winters represent a threat or an opportunity to the Council's corporate target to reduce its carbon emissions by 22%?

We made a distinction here between:

⁶ See: <http://modgov.cherwell.gov.uk/ecCatDisplay.aspx?sch=doc&cat=13106&path=0>. Delegated powers taken from 'Part1 Terms of Reference and Scheme of Delegation'. Accessed 16th March 2010.

⁷ <http://www.energysavingtrust.org.uk/nottingham/Nottingham-Declaration/Developing-an-Action-Plan/2.-Assess-the-situation/a.-Current-and-future>

⁸ [For wind speed UKCIP recommend using the LINK project \(11-member Met Office RCM ensemble\). However, extracting and analysing the relevant data is beyond the scope of this project. Its worth noting that "there is considerable variation in the changes projected \[wind speed using two ensembles available\] and little consistent evidence of a systematic change in wind speed."](#) Murphy et al. (2009).

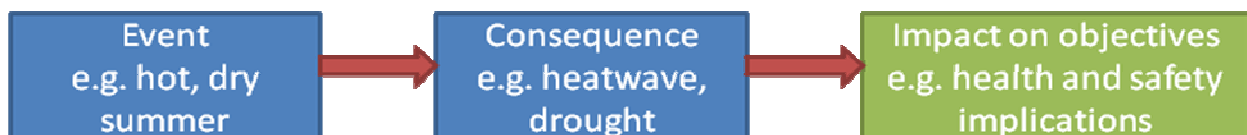
- **Indirect threats** unexpected or non-linear consequences. This might include, for example, impacts in one service area having knock-on effects in another
- **Direct threats** clear and obvious threat; clear link between event and impact
- **Opportunities** clear and obvious beneficial link with event
- **Mixed threats and opportunities** Unclear signal – impact maybe both threat and beneficial

Through this process we developed a long list of threats and opportunities for Council services. We drew wherever possible on existing literature for information on potential impacts or opportunities. Sources are referenced in the text as footnotes. In some cases no significant threat or opportunity was identified. In such cases these services or priorities were removed from the analysis; although we identified a number of cross-cutting risks relevant for the council across the suite of its services and operations.

3.4.3 Stage Three

The third stage was to assess the impacts as risks and opportunities. This was done through the existing risk and opportunity management process and framework used by the Council (see appendix 4). Each threat and opportunity was assessed according to the five point scale used by the Council for *likelihood* of event and *magnitude* of event. However, we have also drawn on the recommendations of UKCIP, we distinguished likelihood in terms of the occurrence of the threat (not just the weather event) and magnitude as the severity of the ‘consequence’ on a specified ‘receptor’ – in this case a service. Scores for likelihood and magnitude were then multiplied to give an overall risk rating. A separate rating system was used for risks and opportunities.

During the analysis, risks and opportunities were framed as questions in terms of event, consequence, impact:



So for example:

What is the risk / opportunity that(the event) could lead to (consequence) resulting in (impact)?

This means assessing the threat to achieving the relevant objectives / targets / priorities or assessing how much the change helps achievement of the objectives

The fourth stage was to consider how the identified risks might change over future time periods (2050s and 2080s) drawing on the UKCP09 scenarios. We carried out this risk assessment categorisation exercise for each of the identified risks and opportunities, under three different future climate scenarios:

- The 2020s ‘medium’ scenario
- The 2050s under a ‘low’ and ‘high’ emissions scenario
- The 2080s under a “low” and ‘high’ emissions scenario

We used only one scenario for the 2020s as we considered that since this is relatively short term, the effect of different emissions scenarios/pathways are unlikely to vary significantly. However, by the 2080s, climate impacts are likely to vary depending on the emissions which have occurred in the intervening years. Therefore it is good practice to consider a spread of possible climate futures although this brings with it a number of challenges. Only 2050s 'low' and 2080s 'high' are reported in the main body of the report.

The analysis was conducted on an excel spreadsheet. The full results are available in appendix 5.

3.4.4 Assumptions of risk assessment

For this analysis we made a number of assumptions:

- **No adaptation.** For future risks we have assumed that no adaptation has taken place. The risks presented therefore represent a baseline for further analysis if required – in other words an assessment with 'no controls'. According to the council's risk management guide, control measures already in place that can be used to manage the risk should be used to produce a current risk score. This is an activity best conducted with relevant internal stakeholders. In some cases there may be ongoing or planned Council activity that will address some of the identified risks (see appendix 10 for a summary of some ongoing action).
- **Council's structure and priorities stay the same.** We have assumed, for the purposes of looking at future risks, that the structure of the council, its services and priorities stay the same. This is quite a big assumption given the speed at which local government changes; however, we feel it is justified as the focus of this assessment is on services and functions that will have to be performed by some form of local government in the future.
- **We have used likelihood and probability to mean the same thing.** The Council's risk handbook guide uses a five point scale to describe likelihood. Probability in UKCP09 is used quite specifically to describe how strong the evidence is that a particular outcome will be realised. So although the two systems do not correspond, we have used the information from the scenarios to make informed decisions about changes in likelihood between the three different timeslices considered.
- **Different emissions scenarios only matter in the 2050s and 2080s.** Based on guidance from UKCIP and the fact that the three different emissions scenarios are not considerably different for the 2020s, we have only considered them in the risk assessment for the 2050s and 2080s. However in some cases for individual variables in the short-term, results from the low emissions scenario may actually be greater than from the high emission scenario. In the 2080s climate impacts will vary significantly depending on the emissions that have occurred in the intervening years. It is therefore recommended to consider a range of emissions scenarios where possible. However, due to time constraints we were forced to focus our efforts. For the 2050s and 2080s we analysed two of the three emission scenarios (low and high), but in the main report we only provide on the results from the 'low' 2050s scenario and 'high' for the 2080s.
- **The risk and opportunity assessment process is subjective.** We have assessed the risks based on our understanding of climate change impacts, the services provided by the Council and the UKCP09 scenarios. The risk assessment was conducted through a number of collaborative working sessions amongst the members of the project team and captured using a spreadsheet. The ambition is that this assessment provides a launch pad for more focused discussions within the Council – to challenge, verify and hopefully acknowledge some measure of risk to key services, objectives and targets.

The results of the above analysis are shown in appendix 5, and show the risks and opportunities we have identified in each of the three tiers and the risk score we have assigned for the three different time frames. The tables also include written explanations and our rationale for the scores given.

3.4.5 Identification of priority adaptation actions

Building on the findings from the risk and opportunity assessment, we then identified a number of adaptation actions that could be put in place by the Council to address the risks. We used existing material⁹ and our own experience of adaptation to list a number of potential options.

3.4.6 Discussion of findings with Service Heads and the Extended Management Team

To help the process of engagement with climate risks across the Council, a template briefing note for service heads was developed based on the risk assessment and the recommended next steps (section 9). Initially this covered:

- Head of Environmental Services (4th May)
- Head of Regeneration and Estates (4th May)

Further, an overview of the risk assessment was presented to the Extended Management Team (18th May).

Further engagement with the remaining service heads is planned for May and June 2010.

⁹ E.g., see: <http://www.energysavingtrust.org.uk/nottingham/Nottingham-Declaration/Developing-an-Action-Plan>

4 Climate Change Impacts, Risks, Opportunities and Adaptation

4.1 Introduction

Some of the changes in climate identified in section 2 could have important implications for Cherwell District Council and the community more widely. Changes in temperature and precipitation could have important direct and indirect impacts on the Councils' ability to deliver key services and avoid unnecessary costs and damages in the future. Areas of the Council with long-term planning horizons should be a particular focus of any subsequent adaptation, especially for buildings and infrastructure that are expected to still be in place in 50 years' time. Decisions taken in the short-term will affect the resilience of infrastructure over the coming decades as the impacts of climate change become more frequent and intense. The Council must also be prepared to play the leadership role in the community it aspires to – although there is some uncertainty in looking into the future, the evidence now demands an appropriate response to the risks of climate change.

To get a better feel for what these impacts might be we can start by considering the impact of weather events on current service provision. The Local Climate Impacts Profile (LCLIP) conducted for Cherwell District Council identified problem areas, which although not hugely significant now in terms of cost (financial, reputational, and political) provide a 'baseline' to understand where and how the Council is vulnerable now (See Box 1). If then we consider that heavy, intense rainfall events are projected to increase in frequency and magnitude (leading to pluvial and fluvial flooding) then we can start to explore how, without adequate planning, vulnerability and costs may increase in the future. Appendix 3 contains a comprehensive list of impacts (both positive and negative) for Cherwell District Council across the strategic, corporate and service levels. It is clear that in some cases, no significant threats or opportunities can be identified. For example; in the Environment and Community service plan, a target under 'waste collection' is "to substantially reduce the amount of waste going to landfill while increasing the recycling rate significantly above 55%." Here, we could not identify any clear link impact from climate change to the Council achieving this target. Undoubtedly, events such as heatwaves and intense downpours may affect the waste service and cause some service disruption (see section 8). But establishing a clear (or non-trivial) causal link between climate change impacts and this target is difficult and perhaps not helpful. In other cases important potential impacts can be identified for a given service, target and priority. This includes, for example, according to the Constitution, 'Building control and engineering services are responsible for the "inspection, repairs, cleansing and maintenance of drains, sewers and similar services". There is a direct link here between what the projections tell us about changes in rainfall intensity leading to increased risk of flash flooding within urban areas and the need for well maintained drains.

Box 1: An example of the costs from weather-related service disruption

Heavy snow fall disrupted waste collection services over a two week period from the 12th to 23rd of January 2010. Because the Council's crews work a compressed week (Tuesday to Friday), there were overtime costs incurred on weekends and Mondays. This amounted to about £29k so that the Council could catch up with waste collections in the District.

In the following sections we discuss some of the most significant **risks and opportunities** identified. We have also identified a number of measures that the Council (and partners) can take to address the risks.

5 Strategic level risks and opportunities

Cherwell's Sustainable Community Strategy, 'Our District, Our Future' sets out a vision for Cherwell for the next twenty years (up to 2030). The strategy is developed through a consultative process by the Local Strategic Partnership involving, residents in rural and urban settings and other organisations across the area.

We analysed the risks and opportunities to Cherwell District Council at the strategic level through the Cherwell Sustainable Community Strategy, in particular:

- What are the risks from climate change of achieving the pledges and priorities identified?
- What are the consequences for the Council and the LSP?

The Sustainable Community Strategy contains in total sixteen pledges across four areas. The full list can be found in appendix 3, Table 16. From our initial analysis of the potential impacts of climate change on the sixteen pledges (under four aspirations) we identified nine pledges that were likely to be impacted by climate change. These nine pledges were thought to be particularly threatened by climate change and so we could identify clear links between the climate events (section 3.4.3) and impacts

However, it is important to recognise that climate change will have impacts on the whole of the community (both direct and indirect) by the 2030s, which is the period of 'vision' for the strategy. So although nine pledges were considered to be at varying degrees of risk, this does not mean that climate change will not affect the others. For more on this, see section 8.

Cherwell District Council may have little direct responsibility for the strategic risks identified; in many cases this will lie with other organisations, such as the County Council. However, unless these risks are addressed they will have negative impacts on the District Council and the local community. The most appropriate response to many of these risks will be to ensure that the relevant organisations are addressing climate risks to their services (an influencing role).

Table 1: Risks at the strategic level

Timeline and emissions scenario				
Pledge	Objective	2020s Risk priority	2050s Risk priority	2080s Risk priority
Economic	Manage our infrastructure development, matching housing growth with local jobs, transport to work, facilities and services. We will plan effectively for our future workforce and employment patterns, focusing on what we need to achieve in raising our skills and actively attracting the right businesses into the area.	Medium risk	Medium risk	Very high risk
	Promote and support business diversification and a sustainable economy in both urban and rural environments. Protect and grow local services and businesses, while supporting town centres to be attractive economic hubs for the district.	Medium risk	Medium risk	High risk
Community	Provide support for older people to ensure they can live independently for as long as possible and appropriate facilities and care are delivered.	Low risk	Medium risk	High risk
	Focus activity on tackling deprivation in both urban and rural Cherwell to ensure that communities do not develop further into the “haves” and “have not’s” leading to cohesive neighbourhoods where all people receive their fair share, get on well together, and have a real sense of belonging.	Low risk	Low risk	Medium risk
	Maintain and develop health services, including preventive health programmes, that directly address health inequality and which enable residents to access services and information in order to lead healthy lives.	Low risk	Medium risk	High risk
	Decrease the percentages of people who fear crime and feel unsafe in their area, reducing the incidence of anti-social behaviour and building confidence in the police and local authority.	Low risk	Low risk	Medium risk
Infrastructure and environment	Cherish the resources that define Cherwell’s character and distinctiveness including our natural environment, our built heritage and the vitality of our towns and villages.	Low risk	Medium risk	Medium risk
	Ensure our social infrastructure grows at the same rate as our communities and current deficiencies in provision are addressed including affordable housing, community buildings, open spaces, cultural and leisure opportunities.	Medium risk	Medium risk	Very high risk
	Improve accessibility and tackle congestion including a shift in transport methods from our reliance on the private car towards public transport and walking or cycling opportunities.	Medium risk	Medium risk	High risk

5.1 Economic Pledge

5.1.1 “Manage our infrastructure development, matching housing growth with local jobs, transport to work.... And actively attracting the right businesses into the area”

This risk to this pledge is expected to develop over time, moving from a medium risk in the 2020s to a very high risk in the 2080s. In Table 1, the risk seems to jump from medium in the 2050s to very high risk in the 2080s – this is because of the choice of scenarios we have reported. Full results can be found in appendix 5.

Different types of climate change impacts put achievement of this pledge at risk. Infrastructure will be directly vulnerable to the gradual changes in climate and extreme events. Impacts to infrastructure include:

Highways / roads:

- Pavement damage caused by excessive heat and water
 - Pavement failure from prolonged high temperatures
 - Scour to structures from more intense rainfall
- Road subsidence and heave due to cycles of wetting and drying of soils (particularly significant on clay)
 - Undermining of foundations due to erosion caused by surface water runoff
 - Landslips and embankment instability
- Road flooding (both pluvial and fluvial) – lack of capacity in drainage network
- Disruptions to maintenance schedule
- Additional costs
 - increased maintenance from prolonged and/ or more rapid growth of vegetation
 - Scour and damage to structures as a result of stronger winds and more storminess (possible)

Buildings:

- Fluvial flooding when high volume of water causes an overflow inundation of neighbouring low-lying land
- Surface water flooding caused when drainage systems fail to cope with the volume of water as a result of intense rain falling in built up areas
- Ground water flooding caused when prolonged periods of rainfall cause the water table or aquifers to rise above ground level
- Difficulties maintaining comfortable internal temperatures in buildings due to:
 - Increases in average summer temperatures
 - Increased frequency and intensity of periods of extreme temperatures
- Structural damage due to ground conditions and soil instability
 - Subsidence and heave due to cycles of wetting and drying of soils - likely to be particularly significant on clay soils
 - Undermining of foundations due to erosion caused by surface water runoff
 - Landslips and embankment instability due to saturation and runoff from intense rainfall
 - Damage from moisture and condensation due to prolonged periods of dampness
 - Structural damage due to increased frequency and intensity of high winds - there is rather greater uncertainty associated with projections of wind speeds than for some other climate variables, but a number of climate models

suggest a likelihood of an increased prevalence of storms, particularly in winter

- Increased likelihood of summer droughts.¹⁰

Indirectly, water shortages during hotter, drier summers and other knock-on effects will also affect facilities and services in this area. However, there may also be opportunities presented by a changing climate, particularly in relation to workforce, employment and skills. This includes:

- Benefits from increased tourism and outdoor leisure activities within the UK
- Opportunities for new types of business related to the low-carbon economy
 - New products or modifications to existing products to respond to a changing market, e.g. flood management technologies, ventilation and cooling, consultancy, measuring and monitoring equipment, climate resilient building materials¹¹
- Increasing requirements for new skills¹²

Potential adaptation options for Highways/roads

There are a wide number of potential measures that can be used to address these risks. To reduce the risk of road flooding:

- Where new roads are proposed routes will need to avoid areas prone to flooding and changes to existing roads in flood prone areas should take account of flood risk
- Ensure drainage networks are maintained and in some cases it may be appropriate to increase drainage capacity

To reduce road subsidence:

- Consider stabilising embankments prone to land slippage
- Consider stabilising pavements prone to high sub-surface flows
- Consider stabilising bridges and other structures prone to subsidence

To reduce the risk of road surface damage and tarmac melting:

- Select road surface materials to minimise the risks – assess new material for viscosity, chipping size, reflectivity, and resistance to scouring
- Provide shading through the use of vegetation (although ensure correct drought tolerant species is selected)

Adequately addressing these risks will involve working in partnership with a range of organisations, including contractors.

Potential adaptation options for Buildings

To reduce the risk of **flooding**:

- Ensuring regular maintenance and clearing of gutters, drains, culverts, etc.
- Undertake audit to understand present capacity of rainwater systems (if this reveals major problems it may be necessary to consider retrofitting options).
- Reviewing of the extent of impermeable surfaces and consider modest measures to mitigate flood risks from surface runoff (e.g. changes to the drainage strategy,

¹⁰ See: <http://www.energysavingtrust.org.uk/nottingham/Nottingham-Declaration/Events-resources/Adaptation-extras/Additional-guidance/Risks-to-Premises>

¹¹ See: http://www.ukcip.org.uk/images/stories/Pub_pdfs/Georgette.pdf

¹² See, for example: <http://www.tuc.org.uk/extras/adaptation.pdf>

maintenance / improvement of watercourses, culverts, drains and sewerage networks) - any significant problems may need more major retrofitting options.

- Review the vulnerabilities of electrical systems - relatively small scale responses to any risks identified, such as the relocation of junctions, switches and outlets above likely flooding levels, may be possible within existing maintenance regimes and budgets. More major responses may require additional resource allocations.
- Ensuring that any vital or valuable goods and equipment are relocated away from any areas of potential flood risks.
- Provision of sand bags and other modest flood defence measures.
- Consideration of changes of use for any areas vulnerable to flooding to minimise impacts.
- Contingency plans in the event of flooding

To reduce the risk of **overheating**:

- Fitting of blinds to south facing windows
- Fitting of cost-effective external shading or shutters
- Use of night time ventilation to cool premises when external temperatures are lower than internal temperatures - this may require physical or operational changes to security arrangements.
- Closing of windows when external temperatures are higher than internal temperatures
- Ensuring the ready availability of drinking water - avoiding need for bottled water

In order to avoid conflicts with carbon reduction (mitigation) objectives the aim should be to minimise the use of air conditioning wherever possible.

A number of these actions (in relation to roads) can be transferred to third party contractors where they manage road maintenance, for example. And where there is unavoidable disruption to maintenance, an element of this will have to be tolerated. Most actions are to control the risk with alternative ways of carrying out routine task, known as “treating the risk”.

5.1.2 “Promote and support business diversification and a sustainable economy...”

In this case there is a threat to local services and businesses from climate change impacts, in particular the consequences of extreme temperature or precipitation events. The risks of climate change on this pledge will be wide ranging and include:

- Damage to infrastructure and premises (see section 5.1.1)
- Decreased availability of suitable land due to increased flood risk (e.g. see text box below):

Environment Agency update flood maps – Cherwell

“Householders are being urged to find out if they are at risk of flooding after the Environment Agency updated its flood maps for parts of Oxfordshire.

The Environment Agency publishes the latest information on flood risk through online flood maps, which are updated as new information becomes available. Improvements to our flood modelling means that resulting changes to the flood maps will affect five areas. These include; Hampton Poyle, Gosford, Water Eaton, Islip and Kidlington.

Although this has shown that there are 268 properties to be reassessed as being at higher risk, 147 of these are protected by the Kidlington Flood Defence. This defence offers protection against river flooding with a 1% (1 in 100) chance of happening each year. Around 19 properties have been reassessed as being at lower risk....

If your home or business is on the flood map you are at risk of flooding, even if you have not been flooded before. It does not mean you will definitely be flooded, but we advise all home and business owners living within the flood map to be aware of the risks, and to plan and prepare accordingly should the worst happen”

<http://www.environment-agency.gov.uk/news/115036.aspx>

Although the Council may have little direct control over this objective, there are key leadership and reputational issues at stake for the Council. There are various ways that climate change impacts can affect businesses, which will in turn affect the ability of the Council to achieve its aim. These include:

Impacts on premises:

- Vulnerability due to proximity to potential river or urban flooding.
- Existing buildings not designed with the future climate in mind. Building fabric and structure could be vulnerable to rain, storms and subsidence. Increased summer temperatures, damp, condensation and mould in wetter winters.
- Pest damage to buildings.

Impacts on processes:

- Reduced productivity or disruption to climate sensitive processes or activities.
 - Manufacturing: temperature sensitive equipment compromised and increased need for cooling.
 - Construction: difficult working conditions and damage during construction process from more torrential rain and storminess. More dust in dry summer conditions.
 - Leisure: pitches, parks, golf links vulnerable to drought.
 - Engineering: greater temperature control required for sensitive materials, structures and processes. Current codes and standards may no longer be appropriate in the future climate.
 - Agriculture: existing crops less viable in the new climate, such as those that rely on a frost. Summer drought reduces water quality. Livestock are affected by excessive temperatures.

Impacts on finance:

- Failure to adapt creates difficulties in securing investment and/or insurance cover at reasonable cost.
- Potential liabilities are associated with previous actions which future changes in climate may reveal as vulnerable.
- Potential liabilities if climate change is not factored into long-term decisions about the future.
- Investment in equipment ties business into climate-sensitive process or activity.

There will also be impacts on markets, staff and logistics (supply chain issues).¹³ These risks will increase over time. However, the flip side is that there will also be some opportunities to businesses in Cherwell that might help the Council achieve these aims. General opportunities for business include:

- Competitive advantage
 - Businesses with redundancy or flexibility built into delivery systems and supply chains.
 - Advantages for early movers in response to changed markets and lifestyles.
- More extreme events means opportunities, e.g. repair, maintenance and clean up services.
- New products or modifications to existing products to respond to a changing market.
- Good risk management will appeal to financiers, insurers and other stakeholders, leading to security for investment and opportunity for reduced insurance premiums.

A key adaptation for the Council is to ensure that climate change issues are considered within the planning system and the LDF. The Cherwell Environmental Strategy (pg 18 to 19¹⁴) recognises this as a key adaptive action.

5.2 Community Pledge

5.2.1 “Provide support for older people to ensure they can live independently...” and “Maintain and develop health services, including preventive health programmes, that directly address health inequality...”

Although in the short-term climate change impacts represent quite a low risk to the achievement of these pledges, the risks develop over time as there may be increased demand for the services and pressure on the ability to deliver.

The objective to “*provide support for older people...*” is at risk, primarily because the target group for this objective is at risk. This means any impact from extreme events, such as flooding or very hot summers, on the more elderly members of the community will increase service demand and potentially also the Council’s ability to deliver these services. The risk is projected to increase over time as the frequency and magnitude of such events increases. However, it is equally important to acknowledge that this service area is likely to grow considerably in the future in line with projections for an ageing population. Government forecasts predict an increase in the over-65 age range of 53% by 2021.¹⁵

Although we consider climate change to represent a low risk to the objective “*maintain and develop health services, including preventive health programmes...*” in the near term; this risk is expected to increase as we move towards the 2050s. The risk to this objective comes mainly from health impacts on the community, such as:

¹³ See: http://www.ukcip.org.uk/images/stories/Pub_pdfs/Georgette.pdf

¹⁴ See: http://www.cherwell.gov.uk/media/pdf/4/4/Environmental_Strategy.pdf

¹⁵ See: <http://www.cherwell.gov.uk/index.cfm?articleid=3658>

- **Heatwave-related health problems:** Heatwaves are projected to become more frequent leading to increased heat and pollution-related illness & deaths. The very old, young, and chronically ill are vulnerable.
- **River flooding & flash floods:** The risk of major flooding disasters caused by severe winter gales and heavy, intense periods of rainfall may: increase contamination of drinking water, increase water borne infections and exposure to toxic pollutants accompanied with psychological consequences, disruption, injuries and deaths. Longer-term effects after the event including stress and mental health problems may also put pressure on service delivery.
- **Infectious diseases:** Cases of food poisoning (*Campylobacter infections*, *Salmonellosis*) and water borne disease (*Cryptosporidiosis*) linked to warm weather are likely to increase.
- **Respiratory problems** such as asthma may increase due to a combination of heat and local pollution.
- **Sunburn and skin cancer:** are likely to increase because of greater exposure to warmer weather. This will affect users of Council services and staff.¹⁶

Potential adaptation options for adult care and health impacts

Adaptation options for adult care and health can be undertaken via planning for changes to service demand. A previous report, undertaken for Hertfordshire's NHS and Adult Care Services, identified a three step process for adaptation in the sector:

- **Stage 1** focuses on building the capacity to adapt, mainly by raising awareness of the vulnerable and conducting research where more information is required. Having resilient healthcare **infrastructure** that can operate fully under conditions of future climate is also an essential element of maintaining adaptive capacity.
- **Stage 2** involves taking action to adapt, but in ways that will either deliver multiple benefits ('win-win') or by providing benefits irrespective of the degree to which the climate changes in future ('no-regrets'). In other words looking for low-cost actions such as building partnership collaboration.
- **Stage 3** entails larger investments, such as structural changes needed to mitigate significant risks (e.g. site re-location, investment in new healthcare technologies or drugs, re-training staff), and should only be undertaken after formally appraising costs and benefits.¹⁷

In terms of adaptation at the community level, the Council should look to play a strong leadership role on raising awareness and encouraging action of those who a) are involved in the care of those older people b) the individuals considered to be at risk themselves.

5.2.2 “Focus activity on tackling deprivation...”

Climate change presents a low risk to the achievement of this objective over most time periods considered by this analysis. There are many factors that will influence the ability of the partnership to achieve the desired outcome and climate change is unlikely to represent a major or direct risk here. However, by the 2080s climate change may well represent an indirect risk to this objective by acting as an additional burden. Although the links are complex, evidence suggests that people in the UK most likely to be vulnerable to climate

¹⁶ See: http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_083955.pdf

¹⁷ See: <http://www.hertsdirect.org/infobase/docs/pdfstore/nhsacsstudy1.pdf>

change are those who already deprived – climate change may therefore exacerbate existing inequalities between areas.¹⁸

Potential adaptation options for deprivation under climate change

Although no concrete adaptation options are recommended for risks to this objective, the situation needs to be monitored. The role of the Council should be one of leadership, ensuring that discussions and planning to address deprivation include consideration of climate change impacts.

5.2.3 “Decrease the percentages of people who fear crime...”

Climate change presents a low risk to the achievement of this objective over most time periods considered by this analysis. As above, climate change may well exacerbate the difficulties of achieving this objective indirectly in the longer term because it is widely thought that hot summer weather leads to increased crime¹⁹ However, it is considerably more challenging to understand the effect that increased frequency and magnitude of hotter summers may have on the Councils ability to deliver this corporate priority. Other social and economic changes are likely to have a far greater contributing role to levels of crime.

Potential adaptation options for deprivation under climate change

Although no concrete adaptation options are required for this objective over the short to medium term, the situation should be monitored in case this changes.

5.3 Infrastructure and Environment Pledge

5.3.1 “Ensure our social infrastructure grows at the same rate as our communities and current deficiencies in provision are addressed...” and “Cherish the resources that define Cherwell’s character and distinctiveness including our natural environment, our built heritage and the vitality of our towns”

Within the pledge two objectives will be at risk from climate change because they relate to infrastructure and hence will be vulnerable to future changes in climate. The pledge covers a wide range of ambitions including: affordable housing, community buildings, open spaces, cultural and leisure opportunities. While each of these ambitions could be assessed as a separate risk, in this analysis we have focused on the overall objective.

Climate change presents a number of impacts to infrastructure as discussed in section 5.1.1. There are some specific risks relating to open spaces:

- Difficulties maintaining traditional and heritage park and garden planting schemes,
 - Seasonal changes to ground conditions with greater risks of flooding and water-logging in winter and drought conditions in summer.²⁰
 - Longer growing seasons with greater maintenance costs
 - Growth of alien species
 - Climate change may affect the prevalence of pests and diseases

¹⁸ See: http://www.esrcsocietytoday.ac.uk/ESRCInfoCentre/Images/ESRC_PP_CC_web_tcm6-35925.pdf

¹⁹ See: http://www.climatesoutheast.org.uk/images/uploads/UKCIP_review_of_SME_vulnerability_and_resilience_to_extreme_weather.pdf

²⁰ Example impacts taken from: <http://www.energysavingtrust.org.uk/nottingham/Nottingham-Declaration/Events-resources/Adaptation-extras/Additional-guidance/Risks-to-Premises>

- And to the landscape in general:
 - There will be changes in the plant and animal species that can survive in particular habitats
 - New species will move into the area as climatic conditions change, and some established species may be lost as their 'climate space' disappears;
 - The timing of seasonal events such as flowering, breeding and migration will change;
 - There will be greater risk of soil erosion and flooding during intensive rainfall events;
 - Extreme weather events (drought, intense storms, floods) are likely to occur more frequently, and habitats may not be able to recover from repeated disturbance²¹

This will affect how the landscape looks and feels. However, there may also be some opportunities:

- Warmer winters and fewer frost days may offer opportunities to grow more tender plants, although these may be restricted by high winter rainfall
- Use of mulching and ground cover planting to retain soil moisture
- Use of water harvesting measures to improve the use of scarce water resources²²

Potential adaptation options for the natural environment and social infrastructure

Adaptation options for the natural environment under this objective involve reducing the risks where possible ('treating the risk'), but also accepting that the natural environment will change over time ('tolerating the risk'). In many cases it will not be cost-effective or possible to maintain natural areas as they are now. Adaptation is about managing change as opposed to trying to keep things as they are i.e. enabling the natural movement of species as climate margins shift northwards, rather than trying to keep native species in a Cherwell that is no longer suitable.

Among the actions to reduce these risks will include:

- Biodiversity planning and drawing on research into resilient plants to grow in the park and more managed semi-natural areas
- Provision and storage of water for parks and gardens
- Planning for year round plant growth management
- Adopt the principles for biodiversity adaptation as set out in Defra publication, *England Biodiversity Strategy climate change adaptation principles – conserving biodiversity in a changing climate*²³
- Provide information for visitors about potential changes

See the potential adaptation options for infrastructure above in section 5.1.1 which are also applicable to this objective.

There is currently no direct consideration given to climate change impacts in the Cherwell Biodiversity Action Plan (2005 to 2010) or in Cherwell Green Spaces Strategy (2008 to 2016). However, these policies do offer an opportunity and suitable means of considering adaptation and making it part of regular planning.

²¹ See: <http://www.energysavingtrust.org.uk/nottingham/Nottingham-Declaration/Local-Services/Environment/Landscape>

²² See: <http://www.energysavingtrust.org.uk/nottingham/Nottingham-Declaration/Local-Services/Environment/Grounds-maintenance>

²³ <http://www.defra.gov.uk/environment/biodiversity/documents/ebs-ccap.pdf>

5.3.2 “Improve accessibility and tackle congestion including a shift in transport methods...”

This pledge is threatened by similar risks to those affecting infrastructure outlined in section 5.1.1, although the effects are likely to be less pronounced as the focus is on changing modes of transport and behaviour rather than the infrastructure that supports this objective.

Potential adaptation measures for shifting transport methods

Whilst the most important risks to local travel are likely to be generic, the Council and relevant partners may need to demonstrate an understanding of how climate change will affect service delivery. According to guidance issued by the Department for Transport, Local Transport Plans should take climate change into account and put in place measures to “improve the resilience of local transport to the impacts of climate change”.²⁴

Most of the actions available can be transferred to third parties, but the Council will need to work in partnership with the relevant stakeholders to ensure they are addressing the risks. Options include:

- Working with the private companies in the region that supply public transport to ensure the service can cope with extreme events and gradual change:
 - Train – options to reduce overheating of carriages, melting of tracks, signal failure
 - Bus – options to reduce overheating, consider change of surface cover to avoid tarmac melting
 - Road / cycle network – more regular verge maintenance to control vegetation over growth, consider change of surface cover to avoid tarmac melting

²⁴ See: http://www.energysavingtrust.org.uk/Media/node_54450/Local-transport-adapting-to-climate-change

6 Corporate level Risks and Opportunities

The Corporate plan consists of four overarching priorities broken down into forty-six targets. The plan also includes an improvement strategy and sets out for a five year period the ambitions and priorities for the Council. This links to the areas of the Sustainable Community Strategy on which the District Council leads.

The risks from climate change to the corporate plan and improvement strategy are wide ranging as befits the broad scope of the plan. Of the forty-six targets, we found thirteen to be at risk and worthy of attention and seven targets where climate change may present an opportunity to the Council. The full list of targets can be found in appendix 3, Table 17. As for the strategic risks discussed in section 5, we have focused on the specific and direct impacts. Section 8 discusses some of the wider implications of climate change to the corporate plan and improvement strategy. Table 2 shows the rating for different risks across different time periods.

A significant number of aims and targets within the corporate section are found to be at high risk. These include:

- Targets which are threatened by physical damage due to flooding – especially targets which require infrastructure components in order to be delivered, such as “providing community facilities and activities to meet local need”;
- Targets where the overall functioning of the Council or its value for money will be threatened due to the totality of impacts affecting the council (a cumulative effect), for example “reduce financial burden to taxpayers”;
- Health-related targets, where climate change will present a threat due to higher temperatures and an increasing number of heatwaves

In many cases our analysis of potential climate change impacts (see appendix 3) found that an impact from climate change could present a mixed risk and opportunity. In such cases, these have been discussed together. A separate section (6.2) discusses opportunities.

Table 2. Risk at the corporate level

Timelines/emissions scenarios		2020s Risk priority	2050s Risk priority	2080s Risk priority
Aim	Target			
Provide business land and premises opportunities to support local economic development.	Complete an employment land assessment and include provision of at least two major new business sites in the Local Development Framework – LDF	Medium risk	Medium risk	Very high risk
	Start construction on Bicester Town Centre Development	Medium risk	Medium risk	Very high risk
Secure housing growth that meets Government targets and the needs of the District through an appropriate mix of market and affordable housing.	Achieve an annual average rate of new homes constructed of 600, of which 100 are affordable	Medium risk	Medium risk	Very high risk
Develop safe and pleasant urban centres which provide you with good facilities.*	Complete environmental enhancement schemes for Watts Way, Kidlington and Parsons Street, Banbury	Low risk	Low risk	Low risk
Help you feel safe in your home and community, working to reduce further our very low level of crime.	Reduce crime by 5% and achieve a perception of feeling safe in Cherwell by 80% of residents Increase partnership working across the public sector and ensure that there are information sharing protocols	Low risk	Low risk	Low risk
Make big improvements to our sports centres.	Complete the modernisation of sports centres at Bicester and Kidlington and construct a new sports centre in Banbury	Medium risk	Medium risk	High risk
Provide community facilities and activities to meet local need	Support and improve 10 existing community centres/village halls and build new centres at Banbury and Bicester where significant new housing development takes place Provide 30 formal and informal recreation opportunities for young people Support 160 older people groups and to increase the numbers of older people participating in group activities by 10%	Medium risk	Medium risk	High risk
Keep streets and open spaces clean and free from litter, graffiti and abandoned vehicles and well maintained.	Achieve 80% resident satisfaction with street and environmental cleanliness	Low risk	Low risk	Low risk

Significantly improve green spaces and public places so that you really notice the difference where you live and work.	Achieve 70% resident satisfaction with green spaces and public areas in conjunction with local parish councils	Low risk	Low risk	Low risk
Put things right quickly if they go wrong.	Resolve 95% of complaints within 14 days	Low risk	Medium risk	Medium risk
Deliver value for money by achieving the optimum balance between cost, quality and customer satisfaction for all services.	Achieve the top rating for the Use of Resources assessment and recognition as a value for money council	Medium risk	Medium risk	High risk
	Meet Government targets for efficiency improvements and are maximising efficiency gains across the organisation	Medium risk	Medium risk	High risk
Reduce financial burden to local taxpayers.	Maintain council tax rises at or below the rate of inflation (subject to amount of Government grant received)	Medium risk	Medium risk	High risk
Be recognised as an excellent authority	Work towards being in the top quartile for all local authorities on the overall customer satisfaction with the Council. Achieve the highest possible rating under Central Government’s inspection regime	Low risk	Medium risk	Medium risk
Ensure there is a culture of continuous improvement and innovation across the Council	We will continue to have ambitious targets. We will continue to receive external recognition for our achievements and innovation for improving performance against national and local performance measures that are achieved and updated each year.	Low risk	Medium risk	High risk
Support business success by fostering innovation and helping businesses to recruit and retain skilled employees.	Create 6200 additional jobs by 2011	Low risk	Low risk	Low risk
Improve the standard of housing particularly for vulnerable people.	Provide and facilitate assistance – through both CDC grants, and insulation and heating discounts in the private sector delivered by partners – to achieve the Decent Homes Standard for vulnerable households	Low risk	Medium risk	Medium risk
Improve local services and opportunities in rural areas.	Complete a review of planning policy framework for villages through the new Local Development Framework – to support sustainable levels of development in rural areas Establish improved support initiatives for existing rural services to assist ongoing viability Encourage the creation of new services to rural areas to meet established demand and gaps in provision	Low risk	Medium risk	High risk

<p>Help to deliver improved healthcare for Bicester and Banbury.</p>	<p>Support the Oxfordshire Primary Care Trust in delivering improved local and responsive healthcare services to meet current and future needs of residents.</p> <p>Reduce the levels of increasing obesity and reduce coronary illness in under 75 year olds by 25% through joint healthy lifestyle promotion initiatives with the Oxfordshire Primary Care Trust</p>	<p>Medium risk</p>	<p>Medium risk</p>	<p>High risk</p>
<p>Make it easy for you to lead a healthy and active life through our countryside, leisure facilities and tourist attractions.*</p>	<p>Increase participation in active recreation by 1% per annum</p>	<p>Low risk</p>	<p>Low risk</p>	<p>Low risk</p>
<p>Protect our environment, wildlife habitats and the countryside, by working with others.*</p>	<p>Achieve a measurable improvement to biodiversity</p>	<p>Medium risk</p>	<p>Medium risk</p>	<p>High risk</p>
<p>Maximise energy efficiency and minimise carbon emissions in our own buildings, and developments.</p>	<p>Reduce the Council’s carbon emissions by 22%</p>	<p>Low risk</p>	<p>Medium risk</p>	<p>High risk</p>

A number of risks are considered to be low over all time periods. These are not discussed further below, although will need to be considered as part of any adaptation strategy.

There are a number of risks that are likely to be increasingly important over time – although in the short-term are potentially not serious. This is because the aims and targets in question are about longer term developments; the consequences of decisions made to achieve these targets will be long lasting and potentially at increased risk over time.

6.1 “Complete an employment land assessment and include provision of at least two major new business sites...”

Planning and support for business that fails to prepare for climate change may undermine the viability of the local economy. Some the impacts from climate change on the ability of the Council to achieve this target have already been discussed in section 5.1.1. Of particular importance are the impacts of heat and flooding:

- Increased flooding of buildings and open spaces may lead to damage to buildings and their contents, contamination from sewage and access problems and also injury, disease and mental stress. Some properties may become uninsurable if they are in flood-prone areas.
- Higher summer temperatures will have serious implications for comfort due to overheating and heat stress. This might lead to increased demand for cooling in buildings, particularly within high density areas where the Urban Heat Island effect is most pronounced.²⁵

The Strategic Flood Risk Assessment conducted for Cherwell District Council identified important areas of flood risk and also considers climate change.²⁶ However, the current Economic Development Strategy (2007 to 2011) does not directly address climate change although the aim to incorporate the principles of sustainable development should allow for this in future iterations.

Climate change will also bring some opportunities to businesses. These have been discussed in section 5.1.2.

Potential adaptation actions for new business sites

By taking into account climate change risks during the development of the employment land assessment (for example ensuring that climate change is one of the considerations required of the contractors), the Council can ensure that at every possible opportunity during the planning process climate change is considered. Considering climate risks in planning documents of this kind will be a key adaptation action. With no adaptation, the risk to this target increases over time as the type of impacts identified above become more frequent and intense.

Other adaptation actions to treat the risk include:

²⁵ See: http://www.tcpa.org.uk/data/files/bd_cca.pdf

²⁶ (and West Oxfordshire District Council). See:

[http://www.cherwell.gov.uk/media/pdf/9/b/Cherwell_and_West_Oxfordshire_SFRA_\(April_2009\)_Including_Appendix_A_E_-_L.pdf](http://www.cherwell.gov.uk/media/pdf/9/b/Cherwell_and_West_Oxfordshire_SFRA_(April_2009)_Including_Appendix_A_E_-_L.pdf)

- Consultation of the Strategic Flood Risk Assessment (2009) conducted for Cherwell District Council and new Environment Agency flood risk maps (2010)²⁷ when making a decision about the sites
- Criterion about the adaptability of the buildings themselves should be included in the decision making – does the design include measures to provide shade and cooling, prevent flooding and overheating? (as set out in section 5.1.1). This is true both for new build and refurbishment.

6.2 “Start construction on Bicester Town Centre Development...”

The risk here is not so much to the construction itself, but the viability of any re-development in the longer term that does not take account of potential climate change impacts on town centres. Some of the impacts mentioned in previous sections (especially with regard to infrastructure and buildings) are relevant here. Others include:

- Higher summer temperatures will have serious implications for human comfort, overheating and heat stress. In built up areas this can lead to an increase in the Urban Heat Island effect.
- Hotter temperatures will lead to greater demand for urban greenspace, blue (water) infrastructure, open spaces and shading
- Greenspace and trees offer a way to cope with hot weather (through shading and evaporative cooling), but are themselves vulnerable to decreased water availability, rising temperatures, and changing patterns of disease and pests
- Increased precipitation intensity in winter will affect building facades and internal structures and lead to more rain penetration around openings.
- More intense rainfall events will mean drainage systems (roof drainage, sewer systems, carriageway drainage etc) are unable to cope, resulting in flash flood events, especially in urban areas.²⁸

Re-development provides a window of opportunity to consider climate risks that may not come again for a long time.

Potential adaptation actions for town centre development

Make sure the development design and plan where possible includes:

- Provisions for interconnected blue and green space (this will also help with biodiversity objectives in a changing climate)
- Shading – selecting the correct species for providing long seasonal or all year round coverage that can withstand high winds, higher summer temperatures, drier soil in summer and potential water logged soil in winter.
- Green space and planting that is permeable and that reduces or alleviates surface run-off.
- Buildings, whilst energy efficient, are also adaptable to higher summer temperatures e.g. shading/screening, natural ventilation etc. (as set out in section 5.1.1).

The Town and County Planning Association²⁹ have produced guidance on adaptation options for planning sustainable communities and guidance has also been developed by the Three

²⁷ <http://www.environment-agency.gov.uk/homeandleisure/floods/default.aspx>

²⁸ See: http://www.tcpa.org.uk/data/files/bd_cca.pdf

²⁹ See: http://www.tcpa.org.uk/data/files/bd_cca.pdf

Regions Climate Change Group on the adaptation issues that planners and developers should consider at each stage of the development process, and ways to respond to them.³⁰

6.3 “Achieve an annual average rate of new homes...”

The risk here is about the potential for homes:

- being built in unsuitable areas
 - flood risk
 - subsidence risk
- being built in an unsuitable manner
 - insufficient drainage capacity to cope with wetter winters and intense downpours
 - Insufficient cooling built-in for hotter summers

Impacts include:

- Failure to adapt may mean that a development proves too expensive to run, too uncomfortable to live or work in, and even uninsurable later in its life.
- Built environment stock in the UK is generally expected to last between 20 and 100 years. It is therefore important to recognise that there will be an expectation among buyers and tenants that developments designed and built now will withstand the impacts of climate change within the lifetime of the development.
- Building regulations and standards will change. By failing to take voluntary measures now (that anticipate future requirements), there is a risk that more expensive remedial measures may need to be taken at a later date to ensure compliance as legislation comes into force
- Increased insurance premiums could add to running costs, affecting the value of the development.³¹

The risks are likely to be shared by the Council and the Developer. For the Council, the risks are likely to be reputational.

Potential adaptation actions for new homes

Make sure the design includes all the latest voluntary building regulations and standards on energy efficiency and include adaptive measures that do not increase emissions over the lifetime of the building. For example, using passive cooling and natural ventilation over air conditioning. Its also important to consult the Strategic Flood Risk Assessment (2009) conducted for Cherwell District Council and the new Environment Agency flood risk maps (2010) as a prerequisite for development approval.

The current Housing Strategy 2005 to 2011 makes no specific mention of impacts or adaptation. The forthcoming Eco Town development at North West Bicester offers Cherwell the opportunity to be at the forefront of developing housing and communities that are both energy efficient and resilient to climate change impacts.

6.4 “Complete the modernisation of sports centres...”

The risks to infrastructure have already been discussed in section 5.1.1.

³⁰ See: <http://www.london.gov.uk/trccg/publications/adapting-impacts.jsp>

³¹ See: <http://www.london.gov.uk/trccg/publications/checklist-for-development.jsp>

Potential adaptation actions for sports centres

Potential adaptation considerations include:

- The need to maintain appropriate threshold temperatures for physical activities in higher average summer temperatures and heat extremes (use of passive cooling and natural ventilation with air condition as a last resort).
- Shade any outdoor play areas from excessive sun and heat
- The use of drainage and permeable surfaces for outdoor play areas to minimise flood risks and to enable areas to recover quickly from intense rainfall.³²

The LCLIP for Cherwell District Council identified a number of specific vulnerabilities relating to flooding and leisure centres.

“The issue of the Spiceball Centre’s vulnerability to flooding is familiar with this facility suffering repeated floods on various scales, due to poor site selection on the floodplain of the river Cherwell and close to the canal and sewer mains. In the first two decades after it was built in the 1970s, there were few incidents, but after the 1998 and 2003 severe floodings, and incidents of ‘near misses’ have continued to rise.

The 2007 floods led to the Centre being out of operation for 3 months and cost approx. £540,000 in refurbishment. Rising flood waters in January and October 2008 was a further close call.”

From Cherwell District Council LCLIP report (2009)

The re-development of the Spiceball leisure centre at a different site, completed in December 2009, cost approximately £16.5 million and its management is sub-contracted out to Parkwood Community Leisure. The contract specifies under “Energy Consumption & Environmental Sustainability” reducing energy loads and water consumption wherever possible and using low carbon technologies, renewable resources and recycling water wherever possible.

There may be opportunities for reducing energy demand for heating during winter.

6.5 “Support and improve 10 existing community centres/village halls...”

The risks to infrastructure have already been discussed in section 5.1.1. In particular the risks to the Council here are reputational and financial. Re-development or refurbishment of existing centres offers opportunities for adaptation. See above adaptation actions (section 5.1.1) in relation to buildings.

³² See: <http://www.energysavingtrust.org.uk/nottingham/Nottingham-Declaration/Local-Services/Leisure-and-Culture/Leisure-centres>

6.6 “Achieve the top rating for the Use of Resources assessment...”; “Meet Government targets for efficiency improvements...”; “Maintain council tax rises at or below the rate of inflation...”; “We will continue to have ambitious targets...” and “Work towards being in the top quartile for all local authorities...”

See section 8 for a discussion of climate change risks more generally at the corporate level and in relation to the Comprehensive Area Assessment (CAA).

6.7 “Provide and facilitate assistance...”

Both the broad aim and target are considered to be at risk, in part because of the impacts of climate change on the groups designated as ‘vulnerable’. While some of the general health impacts from climate change are reviewed in section 5.2.1, it is important here to recognise both threats and opportunities.

Insulation measures, such as installing loft and wall insulation and double glazing, can have a positive effect in keeping houses cooler during the summer, especially during the day by reducing heat penetration. However, much of the risk from overheating is particularly high at night if temperatures do not drop sufficiently for the body to cool down and recover. Insulation can reduce heat loss through the building fabric at night.³³ This risk is expected to increase over time. However, there will also be opportunities from climate change that will help meet this aim and target. The opportunity is less heating required during milder winters.

Table 3. Opportunities (1)

Aim	Target	2020s Opportunity priority	2050s Opportunity priority	2080s Opportunity priority
Improve the standard of housing particularly for vulnerable people.	Provide and facilitate assistance – through both CDC grants, and insulation and heating discounts in the private sector delivered by partners – to achieve the Decent Homes Standard for vulnerable households	High developing opportunity	Medium developing opportunity	Low developing opportunity

With milder winters, there is an expectation that fuel bills will be lower leading to less cold-related illness and mortality amongst the elderly in the community and lessen the impact of fuel poverty. There will also be less heating required during winter, although the possibility of damper conditions and increasingly rare cold winters might make it challenging to realise this opportunity which is expected to decrease over time as the risks from extreme events are expected to increase. We will still experience severe winters (such as 2009 / 2010).

³³ See: <http://www.london.gov.uk/trccg/docs/pub1.pdf>

6.8 “Complete a review of planning policy framework...”

This target is related to the aim of improving local services and opportunities within the rural part of the District. Although climate change is unlikely to affect the ability of Council staff (and any relevant contractors) to undertake the required review, there is a risk to rural services from climate extremes. The Council may find itself in a position where there are increased demands for services but more potential for service disruption. This risk is expected to increase over time and the impacts are in relation to infrastructure (section 5.1.1) and the countryside more broadly (section 5.3.1). Climate change will present an additional burden on the delivery of local services in the longer-term. However, there are also opportunities for rural areas. These include:

- Longer visitor seasons arising from warmer averages temperatures in spring and autumn, particularly for seaside and rural destinations
- Increased UK tourist numbers (residents and visitors) as alternative destinations, such as the Mediterranean and tropical resorts, become less desirable because of excessive temperatures and water constraints³⁴
- Longer growing seasons and opportunities for different crop types

The opportunities are expected to decrease over time and will eventually be outweighed by the risk.

Table 4. Opportunities (2)

Aim	Target	2020s Opportunity priority	2050s Opportunity priority	2080s Opportunity priority
Improve local services and opportunities in rural areas.	Complete a review of planning policy framework for villages through the new Local Development Framework – to support sustainable levels of development in rural areas ...	High developing opportunity	Medium developing opportunity	Low developing opportunity

Potential adaptation actions

Make sure climate change adaptation is included in the review to support sustainable development in rural areas and is prerequisite for the development of new services to rural areas, especially buildings.

6.9 “Support the Oxfordshire Primary Care Trust...”

This target is at risk because the target group of receptors (those deemed to be ‘vulnerable’) are themselves at risk from health impacts from climate change (see section 5.2.1). Indirect effects on service provision are also important:

- Disruption to transport could have significant implications for ambulance services and all aspects of patient care that rely on vehicle access, with consequent potential to endanger the health of those who rely on these services.
- Impacts on buildings could affect the quality of services delivered. In some cases, high summer temperatures may make it impossible for staff and patients to be

³⁴ See: <http://www.energysavingtrust.org.uk/nottingham/Nottingham-Declaration/Local-Services/Leisure-and-Culture/Tourism>

appropriately cared for in buildings unable to maintain comfortable internal working temperatures.

- Impacts that may affect a child’s ability to go to school as usual will add pressure to health and care services if staff attendance is reduced³⁵

This risk is expected to increase over time. There are also opportunities from climate change to help achieve this corporate aim. Mild winters and warmer summers will provide increased opportunities for outdoor leisure activities. However, this opportunity is likely to decrease over time as extreme events increase in frequency and magnitude.

Table 5. Opportunities (3)

Aim	Target	2020s Opportunity priority	2050s Opportunity priority	2080s Opportunity priority
Help to deliver improved healthcare for Bicester and Banbury.	Support the Oxfordshire Primary Care Trust in delivering improved local and responsive healthcare services to meet current and future needs of residents....	High developing opportunity	Medium developing opportunity	Low developing opportunity

Potential adaptation actions

The risks to service delivery – particularly from warmer summers and very hot days and nights should be addressed as a priority. This can be undertaken via changes to service provision by planning for greater demand at particular times of year. Increased service provision may be essential as the vulnerable are at higher health risks in such situations.

It is possible to reduce the risk by working with health and social care providers and develop a checklist/ standard for dealing with preparedness for a heatwave following the guidance in the Department of Health’s publication (2009) *Heatwave – supporting vulnerable people before and during a heatwave: advice for health and social care professionals*.

6.10 “Achieve a measurable improvement to biodiversity...”

There are both risks and opportunities for this target. Hotter drier summers will threaten some species (cold, damp loving species), which will require careful management of biodiversity and key species. Certain types of species will be at risk:

- Those that rely on the timing of particular seasonal events (e.g. changes in the availability of a particular food type)
- Those that rely on a set of particular climate conditions
- Those that rely on a particular habitat type (potential changes in the composition of plant and animal communities)

However, milder winters and hotter drier summers will also favour some existing species and allow other species to move into the new climate space (heat loving drought resistant species), which may increase biodiversity, although there is an opposite threat from the reduction in numbers of species which cannot tolerate heat or drought. Much will depend on

³⁵ See: <http://www.hertsdirect.org/infobase/docs/pdfstore/nhsacsstudy1.pdf>

the statutory obligation the Council must fulfil with regard to biodiversity and the protection of particular species. Over the time frames used in this assessment, the opportunities will soon be outweighed by the risks.

Table 6. Opportunities (4)

Aim	Target	2020s Opportunity priority	2050s Opportunity priority	2080s Opportunity priority
Protect our environment, wildlife habitats and the countryside, by working with others.	Achieve a measurable improvement to biodiversity	High developing opportunity	Medium developing opportunity	Low developing opportunity

Potential adaptation measure for biodiversity

Adaptation options for the natural environment under this objective involve reducing the risks where possible ('treating the risk'), but also accepting that the natural environment will change over time ('tolerating the risk'). In many cases it will not be cost-effective or possible to maintain natural areas as they are now. Adaptation is about managing change as opposed to trying to keep things as they are i.e. enabling the natural movement of species as climate margins shift northwards, rather than trying to keep native species in a Cherwell that is no longer suitable.

Among the actions to reduce these risks will include:

- Adopt the principles for biodiversity adaptation as set out in Defra publication, *England Biodiversity Strategy climate change adaptation principles – conserving biodiversity in a changing climate*.³⁶
 - Take practical action now
 - Maintain and increase ecological resilience
 - Accommodate change
 - Integrate action across partners and sectors
 - Develop knowledge and plan strategically
- Provide information for visitors about potential changes.

6.11 “Reduce the Council’s carbon emissions by 22%...”

Hotter summers may increase the requirement for energy intensive cooling systems, such as air-conditioning, especially in older buildings. However at the same time milder winters will reduce the need for heating within the community. The benefits from milder winters and subsequent reduced demand for heating are more likely to accrue in the near term; however as climate change continues the negative impacts are likely to outweigh any positive gain.³⁷

Table 7. Opportunities (5)

³⁶ <http://www.defra.gov.uk/environment/biodiversity/documents/ebs-ccap.pdf>

³⁷ See: <http://www.ipcc.ch/pdf/assessment-report/ar4/wq2/ar4-wq2-spm.pdf>

Aim	Target	2020s Opportunity priority	2050s Opportunity priority	2080s Opportunity priority
Maximise energy efficiency and minimise carbon emissions in our own buildings, and developments.	Reduce the Council's carbon emissions by 22%	High developing opportunity	Medium developing opportunity	Low developing opportunity

A number of opportunities relating to the corporate plan and improvement strategy were identified. These opportunities are generally caused by gradual changes in climate, rather than the more extreme events such as heavy winter rainfall and heatwaves. However, as the climate changes these opportunities will probably become less tangible or harder to take advantage of. This means that in the 2020s these opportunities will require active engagement to increase the benefit or to increase the probability of the opportunity being realised.

Table 8. (Opportunities (6))

Aim	Target	2020s Opportunity priority	2050s Opportunity priority	2080s Opportunity priority
Support business success by fostering innovation and helping businesses to recruit and retain skilled employees.	Create 6200 additional jobs by 2011	Low developing opportunity	Low developing opportunity	Low developing opportunity
Make it easy for you to lead a healthy and active life through our countryside, leisure facilities and tourist attractions.	Increase participation in active recreation by 1% per annum	High developing opportunity	Medium developing opportunity	Low developing opportunity

6.12 “Create 6200 additional jobs by 2011”,

There may be some job creation in the area as a consequence of business opportunities. This could be as a result of increased tourism or outdoor leisure activities, links to the transition to a low carbon economy (energy efficiency, low carbon technologies) and potentially increased work in other related sectors. This is considered to be a limited opportunity as changes in climate may also cause some businesses to fail.

6.13 Increase participation in active recreation by 1% per annum

In the short-term, warmer summers and milder winters may increase the opportunities for outdoor recreation. Realising this opportunity will depend on a number of factors, and the benefits are likely to be indirect and therefore difficult to realise and quantify. This could be an important opportunity in the short-term but is likely to decrease in the longer-term as summer climate may become less hospitable.

7 Service area risks and opportunities

The Constitution identifies a number of important delegated powers to key functions within the Council. The constitution identifies forty delegated powers; we identified two of these powers ('Recreation and health' and 'Urban and rural') being at risk from climate change. For the full list see appendix 3.

In addition, we have analysed one service area plan in more detail: the Environmental service plan. Out of twenty one targets within this plan, we identified seven that were at risk.

7.1 Recreation and Health

The risk here is related to the overall responsibility for “management of all Council community facilities”. This objective is directly threatened by impacts to physical infrastructure as discussed previously in section 5.1.1. This risk is expected to increase over time as extreme events occur more frequently and have a greater effect on infrastructure. The costs of maintaining community facilities are likely to increase and because this is a community facing objective, there is potential for reputational damage.

Table 9. Risk – Recreation and health

Key Objective	2020s Risk priority	2050s Risk priority	2080s Risk priority
The management of all Council community facilities.	Medium risk	Medium risk	High risk

Potential adaptation options for infrastructure in relation to Council community facilities

See the potential adaptation options for infrastructure above in section 5.1.1 which are also applicable to this service area.

7.2 Urban and Rural services

Tree species which are currently widely used may not cope well with drought and heat events in the future – either from the more gradual, cumulative changes or extremely dry and hot summers. Changing winter conditions may also affect tree survival and any increase in storminess could lead to further damage. This will mean existing trees deteriorate and possibly die-back, and may require new species to be considered for future planting. Trees are long-lived and may take a long time to reach maturity.

Table 10. Urban and rural

Key Objective	2020s Risk priority	2050s Risk priority	2080s Risk priority
The planting and maintenance of trees on Council-owned land or Council controlled land.	Medium risk	Medium risk	High risk

There may also be an opportunity to plant a variety of tree species more suited to the changing climate conditions, but this opportunity may be difficult to realise. New varieties of tree may be unpopular or have problems of their own – such as root damage to buildings and drainage networks.

Potential adaptation options for trees

Containment actions to treat the risk for tree planting and maintenance include:

- Consider changing the timing of activities such as pruning, weeding or leaf clearance
- Research and apply different management responses if prevalence of pest and diseases changes

7.3 Environmental Services

The Environmental service plan provides an example of the type of risks likely to be experienced by a service area. The service plans are produced annually and therefore have very prescribed time horizons.

In the short-term none of the targets in the service plan were identified as being at serious risk (very high risk). This is perhaps not surprising given the short-term nature of the service plan, the specific nature of the targets and the expectation that some consideration of weather-related impacts will already be included in the plan (e.g. in the form of contingency budget or as pre-identified risks). In the longer term, given the assumptions we outlined in section 3.4.4, some of the targets may be at risk from climate change, but these risks mainly require 'good housekeeping'; such as reducing the likelihood of the risk if this can be done cost effectively and frequently re-assessing the situation to ensure conditions remain manageable through existing risk management measures.

The objective that may require more careful planning is in terms of carbon emissions reduction. Conditions should be re-assessed regularly.³⁸

Table 11. Risks – environmental service

Objective	2020s Risk priority	2050s low Risk priority	2080s high Risk priority
Deliver high levels of customer satisfaction -Pest Control	Low risk	Medium risk	Medium risk
Develop our low cost recycling bank network to increase accessibility in the few areas where facilities are absent and to enhance the range of materials collected	Low risk	Low risk	Medium risk
To further improve the overall cleanliness of the district securing increased customer satisfaction	Low risk	Medium risk	Medium risk
Deliver financial savings while continuing to deliver high cleanliness standards and high levels of customer satisfaction	Low risk	Medium risk	Medium risk
Reduce the environmental impact of the (waste management/collection) service	Low risk	Medium risk	Medium risk
Lead and co-ordinate the reduction of emissions from the Council's operations	Low risk	Medium risk	Medium risk
Engage residents and businesses to reduce emissions across the district	Low risk	Medium risk	High risk

³⁸ From 'Managing risk and opportunity: a practical guide to risk and opportunity management in Cherwell District Council'.

There may also be opportunities provided by climate change that are relevant to this service area. Both relate to the Council's desire/objective to reduce emissions as part of climate change mitigation efforts. Milder winters in the future could lead to a reduction in the need for winter heating, and hence to a commensurate reduction in energy consumption and in emissions within both the Council and the community more widely. The benefits from milder winters and subsequent reduced demand for heating are more likely to accrue in the near term; however as climate change continues the negative impacts are likely to outweigh any positive gain.³⁹ This means the opportunities may not be fully realised.

Table 12. Opportunities – Environmental service

Objective	2020s Opportunity priority	2050s opportunity priority	2080s opportunity priority
Lead and co-ordinate the reduction of emissions from the Council's operations	Medium developing opportunity	Medium developing opportunity	Low developing opportunity
Engage residents and businesses to reduce emissions across the district	Medium developing opportunity	Medium developing opportunity	Low developing opportunity

Potential adaptation options for Environmental Services

No concrete actions are required as these risk mainly require 'good housekeeping' The risks may require some risk mitigation to reduce the likelihood if this can be done cost effectively, but good housekeeping to ensure that the impact remains low should be adequate. Each objective owner should re-assess frequently to ensure conditions remain the same⁴⁰. Reducing carbon emissions requires that the Council considers alternative methods of cooling during the summer.

³⁹ See: <http://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-spm.pdf>

⁴⁰ From 'Managing risk and opportunity: a practical guide to risk and opportunity management in Cherwell District Council'.

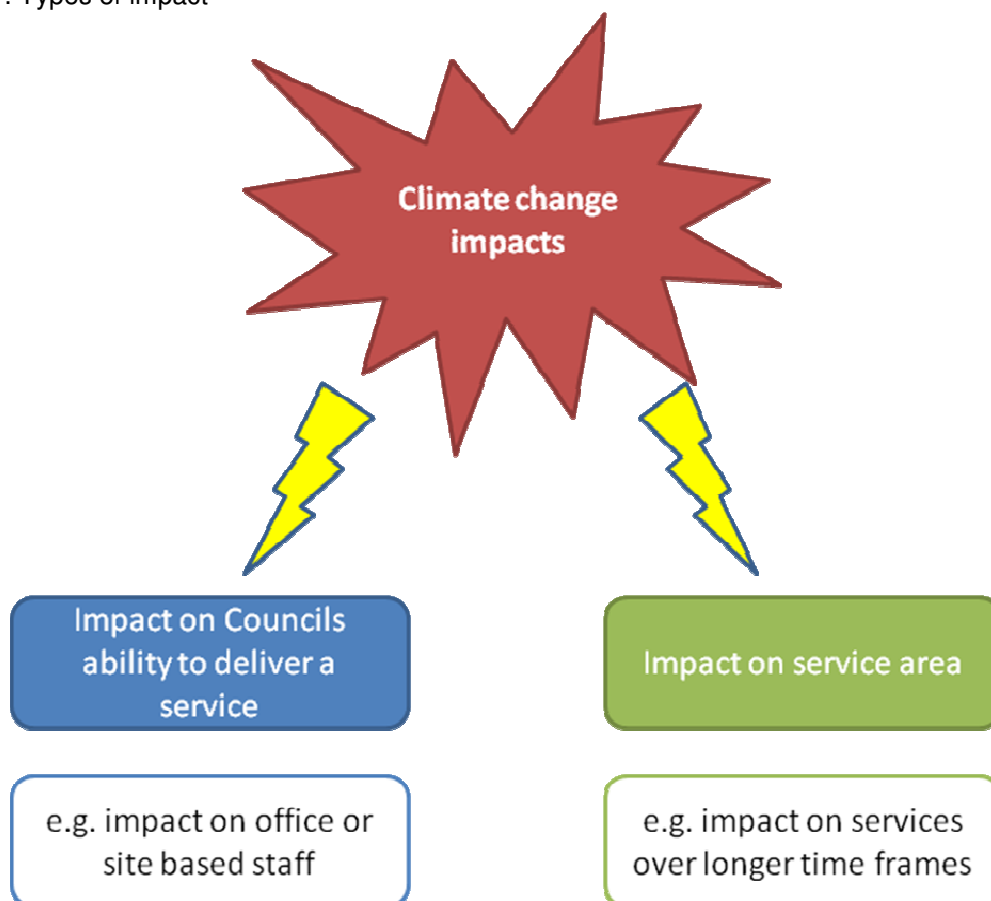
8 What do the risks mean?

Before summarising the priority risks for the Council it is necessary to explore exactly what the risks mean.

8.1 Distinguishing between types of risk

From the analysis of both the risks and opportunities, it is clear that climate change will affect Cherwell in many different ways and this in turn will affect the aspirations and objectives for community planning and service delivery. In the cases identified above direct risks have been identified but there will also be other, more widespread risks that may not be directly related to objectives (such as those identified here). So saying there is no particular threat from climate change to the Human Resources unit within the Council does not mean there are no risks to staff. Climate change may not unduly affect the ability of the unit to function and deliver its services, but there will be effects from climate change more widely, see figure 1.

Figure 1. Types of impact



The more widespread risks are identified here:

Heatwaves and drought

- summer water shortages, low stream flows and water quality problems
- increased risk of subsidence in subsidence prone areas
- increasing thermal discomfort in buildings and health problems in summer⁴¹
- Failure of transport networks due to buckling rails and overheating of train power sources.
- Water shortages (domestic, agriculture, industry, fire & rescue)

Heavy rainfall and flooding:

- an increase in the risk of riverine flooding and erosion
- increased pressure on drainage systems
- Flooding of emergency service providers – police, hospitals, fire & rescue – and other critical public services, e.g. schools, council offices
- Loss of supply from critical public services – water, power
- Failure of transport networks due to floods, collapse of embankments, landslips, flooding of train / tram power sources. Travellers marooned en-route.
- Water contamination & water borne diseases
- Increase in number and severity of wildfires (grassland & forest fires) and fires more generally
- Water pollution caused by a combination low water flow and heat
- Increased hospital admissions and pressure on care services
- Failure of power supplies due to overheating of electricity sub-stations

Generic:

- Pressure on health services due to increased admissions
- Long-term health and psychological consequences
- Disruption of food supplies following failure of transport networks⁴²
- a potential increase in winter storm damage
- Office working conditions during hot summers – risk to staff and decreased productivity and efficiency
- Increased financial cost
 - direct and indirect costs associated with extreme events
 - potential changes to the costs and availability of insurance
 - potential changes to the value of climate-vulnerable assets
 - costs associated with adapting to a changing climate⁴³
- knock-on effects
 - the ICT network and infrastructure
 - The Councils performance (e.g. in relation to CAA)

Focusing on services and objectives is required by the Councils existing risk process and also fundamental to the principles behind the comprehensive risk assessment required under NI 188; however consideration of wider effects on the community in areas outside the councils direct control or influence must also be considered.

⁴¹ From: http://www.ukcip.org.uk/images/stories/Pub_pdfs/MeasuringProgress.pdf

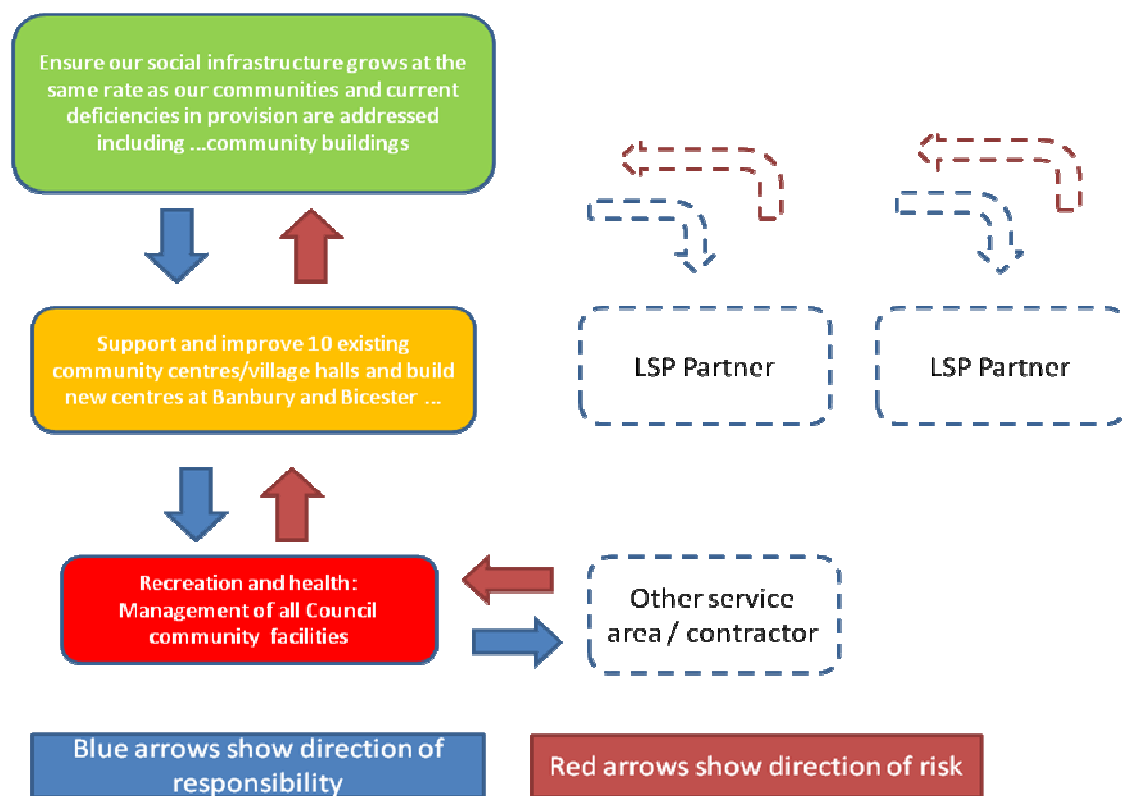
⁴² See: http://www.energysavingtrust.org.uk/Media/node_54450/Emergency-Planning-Adapting-to-climate-change

⁴³ From: <http://www.energysavingtrust.org.uk/nottingham/Nottingham-Declaration/Local-Services/Corporate-Functions/Finance>

8.2 Links between risks at different levels

It is possible to identify a ‘chain of risks’ that connect the different tiers of the Council’s activities looked at in this report. Risks relevant to the pledges of the Sustainable Community Strategy are directly relevant to the objectives and targets at the corporate and service level. If the risks are not dealt with effectively at the right tier then this will have consequences for the ability to deliver the bigger strategic aims for the community. It is particularly important that any actions taken to address the risks take account of these inter-linkages. So for example, as depicted in figure 2, responsibilities for achieving the activities at the community level will be the responsibility of both the Council (and so reflected in the Corporate plan and at the relevant service planning) and other organisations within the LSP. However, the risks from climate change will also flow between the different tiers and different organisations involved.

Figure 2. Links between risks



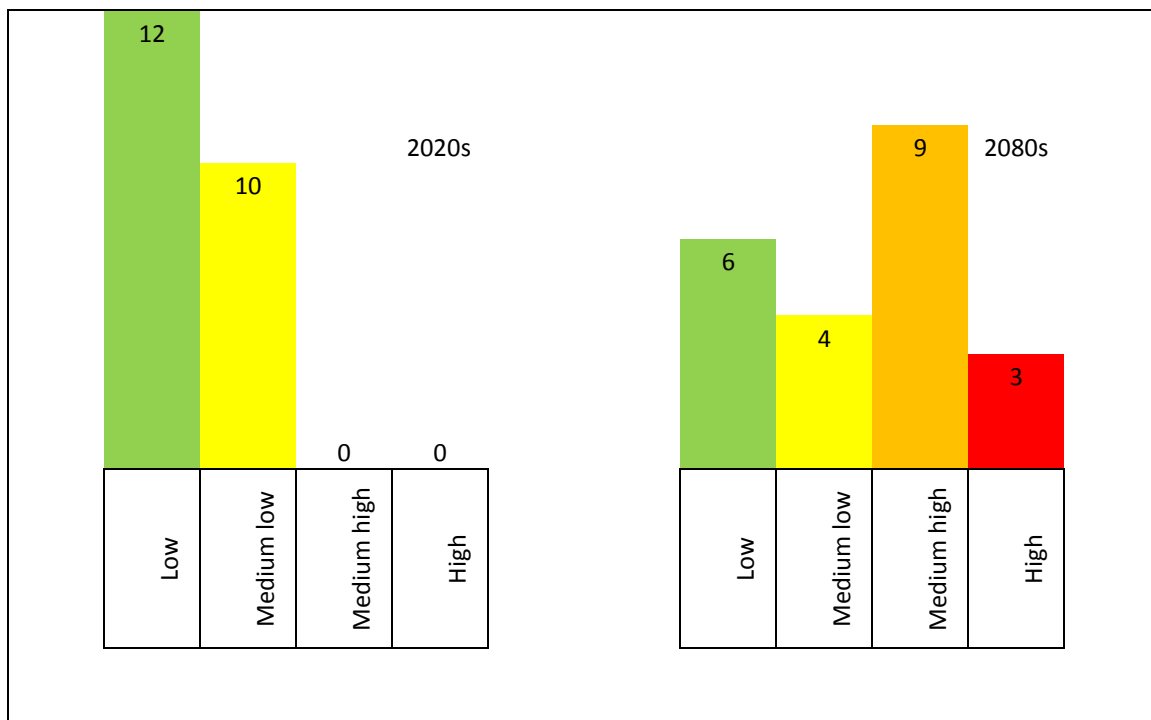
Adapting to climate change is identified in the Sustainable Community Strategy as a ‘future challenge’ for Cherwell. The Strategy comments “it is our responsibility to take a robust approach and adapt to these climate and environmental changes as they occur.” Climate change, and the adaptation required to adjust to its impacts, is a future challenge, but also one that needs to be addressed now. This is particularly true for decisions being made today whose consequences will be felt in the future. These impacts will have important knock-on impacts to the Council, some of which emerge in relation to the risks to the corporate plan and improvement strategy discussed in section 6. In some cases it may be necessary to trace the links between the different tiers and determine who (at the different levels) is responsible for managing risks. This will help identify where the crucial leverage points for action will be.

A further issue here for the Council is in terms of outsourced work. Climate change may directly affect the ability of the Council to achieve these targets through the combined effect of gradual changes and extreme events but there may also be important indirect reputational effects if the actual work itself is outsourced to third parties. While this issue is likely to be covered in the short-term (contract length) climate change may affect the longevity and suitability of the work.

8.3 Risks over time

The key issue at the corporate level is to understand and communicate how and when the risks from different events and impacts will change **Error! Reference source not found.** over time. In Figure 3, the two charts show the risks at the corporate level for the 2020s (left hand chart) and 2080s (right hand chart). It’s important to note that over time, the number of high and very high risks increase in number.

Figure 3. Risks over time



This means that in the shorter-term the risks may be limited. However, doing nothing is only a viable strategy if consideration is given to responding to risk in the longer-term. This includes:

- At the very least ensuring that decisions made today will not increase vulnerability in the future. **Today’s decisions must account for how long their effects will be felt – the timescales of the decision should inform the timing and nature of your response.** It’s also important to acknowledge that **even short-term decisions may be nested in longer-term choices**
- Looking for opportunities now to reduce the possibility of the risks being realised. As stated in section 3.4.4, we have assumed in our assessment that the Council will do

nothing to respond to the risk of climate change (in other words this is the risk “any controls have been applied”)⁴⁴

- Ensuring that risks are monitored and recorded both at the service and corporate level
- Ensure that partners within the area and contractors are aware of the risks and their responsibilities
- Understand where the best intervention points are. For example: as contracts are re-negotiated, as plans are renewed and as strategies are developed.
- Try to understand, or further explore, where the limits of particular services ability to cope will be reached.

We have not captured every potential risk from climate change. It is highly likely that new risks will emerge in the future, perhaps in relation to social, political or economic changes more widely.

8.4 Comprehensive Area Assessment

The risks and any response are all relevant for the Councils performance in relation to the Comprehensive Area Assessment (CAA). The CCA is composed of two strands: an area assessment based on the Local Area Agreement and the Sustainable Community Strategy. In the CAA area assessment, climate change may feature in terms of:

- *How well priorities for climate change adaptation and / or mitigation, as expressed in Local Area Agreements and Sustainable Community Strategies, are being delivered?*
- *What are the prospects for future improvement for climate change adaptation and / or mitigation. Do local partners have the capacity and capability to deliver on their climate change priorities?*

For the organisation part of the CAA, under the ‘use of resources’, relevant themes and key lines of enquiry are:

Governing the business

- *Does the organisation manage its risks and maintain a sound system of internal control?*
 - has effective risk management which covers partnership working
 - has a clear strategy and effective arrangements, including allocation of appropriate resources, to manage the risk of fraud and corruption; and
 - has a sound system of internal control including internal audit.

Managing resources

- *Does the organisation manage its assets effectively to help deliver its strategic priorities and service needs?*
 - has a strategic approach to asset management based on an analysis of need to deliver strategic priorities, service needs and intended outcomes;
 - manages its asset base to ensure that assets are fit for purpose and provide value for money; and works with partners and community groups to maximise the use of its assets for the benefit of the local community.
- *Is the organisation making effective use of natural resources?*

⁴⁴ From Cherwell District Council risk and opportunity management guide.

- understands and can quantify its use of natural resources and can identify the main influencing factors;
 - “strategy and delivery plans “to address climate change mitigation and adaptation”⁴⁵
- manages performance to reduce its impact on the environment; and
- manages the environmental risks it faces, working effectively with partners.⁴⁶

In terms of climate change, the questions asked of a local authority under this theme could include, is the Council:

- Planning its finances to effectively deliver its climate change priorities?
- Shaping and commissioning procurement to support climate change alongside other priorities?
- Managing its performance to reduce its impact on the environment, including its carbon emissions?
- Managing the environmental risks it faces, including the risks of a changing climate?⁴⁷

Managing Performance

- *How well is the organisation delivering its priority services, outcomes and improvements that are important to local people?*
- *Does the organisation have the leadership, capacity and capability it needs to deliver future improvements?*

In terms of climate change, the questions asked of a local authority under this theme could include,:

- Is the Council delivering its contribution to local climate change adaptation and / or mitigation priorities, as expressed in Local Area Agreements and Sustainable Community Strategies?
- Does the Council have the leadership, capacity and capability to deliver future improvements in local climate change priorities?
- Is the Council providing the necessary leadership for the delivery of local climate change priorities across the locality?

The Council may have to bear increased direct costs due to damage to infrastructure, buildings, and services from flooding events and ‘creeping’ costs due to changes in the growing season, and an increased requirement for ditch and gully clearing. It is equally important to note here that a change in approach could turn these risks into opportunities for the Council to demonstrate its leadership on climate change. In order to maintain the Councils high performance and rating climate risks and adaptation must be given serious consideration.⁴⁸

In March 2009, Cherwell District Council was assessed as ‘excellent’ by the Audit Commission under the Comprehensive Performance Assessment. The executive summary of the report on the Council by the Audit Commission found that:

“The Council...provides strong performance and risk management, allied to robust financial management and service quality. The Council is performing strongly against its own priorities

⁴⁵ See: <http://www.audit-commission.gov.uk/SiteCollectionDocuments/MethodologyAndTools/Guidance/uorauditorguidance200910.pdf>

⁴⁶ See: <http://www.audit-commission.gov.uk/SiteCollectionDocuments/Downloads/20091030uorframework.pdf>

⁴⁷ See: <http://www.energysavingtrust.org.uk/nottingham/Nottingham-Declaration/Performance-Measures/Comprehensive-Area-Assessment-CAA/How-does-CAA-assess-climate-change>

⁴⁸ See: <http://www.auditcommission.gov.uk/pressoffice/pressreleases/Pages/20090317cherwell.aspx>

*and is highly effective in delivering wider community outcomes in partnership with others. The Council is ambitious for Cherwell and works to good effect within the district and through to the sub-regional level to deliver its ambitions. The clear vision for the area is underpinned by ambitious aims and the Council has developed clear priorities and plans to deliver its future agenda.*⁴⁹

To maintain such status is always a challenge, especially given the current financial situation. Climate change represents a threat to the Council: directly from impacts and indirectly from regulation, legislation and the expectation of the auditors under CAA. However, from another perspective climate change offers an excellent opportunity for the Council to demonstrate that it is still 'ambitious' for Cherwell and is managing its environmental risks in all forms. It is important for the Council to provide leadership on responding to these risks and help influence the adaptation agenda within the local community and through the Local Strategic Partnership.

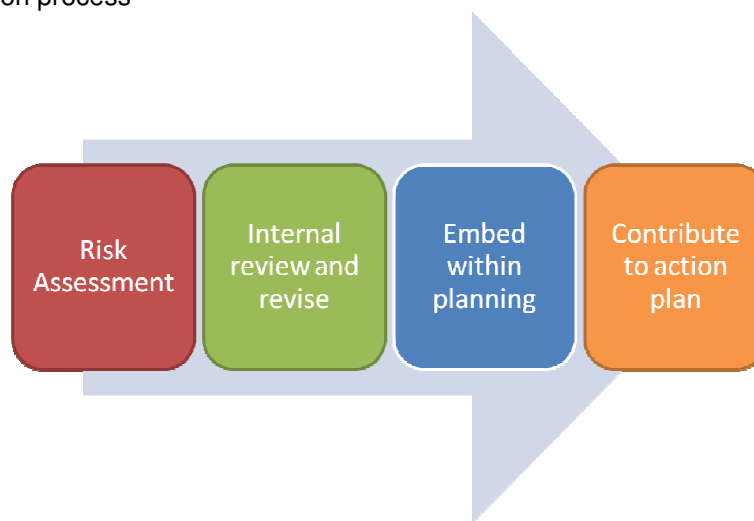
⁴⁹ See: <http://www.audit-commission.gov.uk/SiteCollectionDocuments/InspectionOutput/CorporateAssessments/20090317cherwell.pdf>

9 Next Steps

In order to meet the dual challenge of a) developing plans with partners and the community to address the impacts of climate change as per the Nottingham Declaration and b) making further progress on NI 188 (for completing Level 2 and working towards Level 3), this section provides a number of recommendations for the Council. Building on this risk assessment, we recommend that the following steps are taken:

- **Review** the findings internally and revise where necessary
- **Embed** climate risk within Council planning
- This will help provide material and structure for an **adaptation action plan**.

Figure 4. Adaptation process



- **Internally review and revise the risk and opportunities assessment.** This assessment has been put together without consultation with staff and managers in the various service areas and units reviewed (those with responsibility for the objectives considered to be ‘at risk’). It is necessary, therefore, for the next stage to involve the practitioners and experts working in each area in reviewing, and amending the assessment. However, it should be acknowledged that discussions of uncertainty, probabilities and changes over long-time horizons make it difficult to act or even feel that action is necessary. There will be current and planned work that may help the Council’s adaptation to the risks identified. The relevant service areas and Council as a whole will then need to determine whether they are doing enough to mitigate the risk or develop the opportunity and the extent of the Council’s appetite for climate risk. This will help the process of thinking about when action on future risks needs to happen.
- **Embed risks.** This will require engagement with staff at all levels, elected members and senior management with the ultimate ambition that **climate risks are embedded within existing decision-making process and planning**. This might include, for example modifying the service planning template so ensuring that climate risks are considered.
- **Start the development of a comprehensive adaptation action plan.** This should:
 - Cover all the Councils activities, functions and departments (from service planning to the corporate level)

- Cover the community and LSP
- Be based around a set of realistic objectives and a clear purpose
- Identify a clear timetable for action
- Identify responsibilities for delivery and management – for example an internal ‘climate change board’
- Identify resources required and available
- Establish a programme for monitoring and reporting – both the climate risks and the implementation of the action plan
- Include specific actions for specific risks - in sections 5 to 7, we have identified a number of measures that could be used to address the specific risks identified at the strategic, corporate and service levels
- Include more generic actions such as:
 - Monitoring the consequences of weather-related impacts
 - Raising awareness within and outside the council
 - Work in partnership and develop the plan in partnership
 - Building the evidence base – if further information is required (e.g. risks at particular locations, sites or assets).

9.1 Adaptation – ongoing and planned activity

There are a number of existing sources of information on the adaptation actions already being undertaken by the Council. Sources include the:

- Cherwell Environmental Strategy for a Changing climate
- Stock-take of the consideration of climate change adaptation in Cherwell District Council official documents (December 2009)
- Submission for NI 188 Level 2 (2009 / 2010)

Generic on-going action on adaptation includes:

- Reducing **water consumption** through water efficiency measures and water recycling – water management plans. This will help to address any risks associated with reduced water availability caused by hotter, drier summers.
- Increased levels of liaison with the Environment Agency and Thames water over **local flood risk**. This includes maintaining a database of properties at risk, continuing to provide support in the events of flooding and minimising the risks of flooding through the LDF.
- Incorporating sustainable development as a fundamental principle in the LDF (including a consideration of the need to consider resilience to the impacts of climate change). This includes refurbishment and relocation of buildings

For more examples, see appendix 10.

9.2 Using this report

This assessment of both risks/opportunities and adaptation options builds on work already undertaken and our hope is that it will help with the wider engagement of climate risks across the Council.

We have identified different ways to use the report for the different groups e.g. for the Environmental Services team who are leading adaptation within the council, service area

managers and senior management. Actions for the next stage for these different groups are outlined below.

Action List for key Council staff

For the Environmental Services Team:

-
- Use this report for awareness-raising across the Council and with external partners (LSP).
-
- Targeted engagement with those objectives or functions scoring particularly highly (and especially those issues which need more than one service area / partners to work together to address the issue).
-
- Targeted support in terms of follow-on research to quantify risks in key areas, and explore existing or possible strategies to mitigate risks (e.g. look for case studies or best practice in other LAs to learn from).
-
- Provide focal point for the development of an for adaptation strategy / action plan
-
- Drive forward NI188 related next steps (For completing Level 2 and working towards Level 3).

For senior management:

-
- Review and compare with risk assessments on other issues.
-
- Further work to explore the scale and urgency of these risks in relation to others – perhaps through integration of this assessment method with existing risk management processes.
-
- Work with the environmental services team to identify timeframes for developing a comprehensive action plan
-
- With target service areas, agree which risks require mitigating action, and timeframes for undertaking actions.

For heads of service:

-
- Review the findings – do you agree? Do you need more evidence?
-
- Identify risks that will require attention and identify appropriate owners to act on them.
-
- With the environmental services team, source additional information on the scale/nature of risk or possible mitigating actions.
-
- Engage with partners implicated by priority risks.

-
- Identify the appropriate mechanisms for embedding risk management action (which plans, strategy, operational procedures could be used).

An appropriate response to climate risks may be to 'do nothing' as long as this decision can be justified. If more information on specific risks is needed, then more information is available from the dedicated UKCP09 'user interface'. This includes a 'weather generator', a tool that can be used to explore statistical representations of daily weather, rather than annual or seasonal climate.

10 Conclusion and Priority risks

This section provides our conclusions and priority risks.

10.1 Conclusions

- In the short-term (2020s) many of the risks from climate change are considered low. In many cases existing contingency planning and risk management will help the Council to cope with the consequences of extreme weather events. There will also be opportunities for the Council in the short-term, although realising these may be difficult and any cost savings indirect.
- In the longer term (2050s and 2080s) the risks increase substantially both in terms of likelihood and magnitude. The UKCP09 projections suggest that Cherwell's climate will be very different in the future and change considerably from what residents, local businesses and the Council are used to. This might include summers that are warmer and drier, winters that are milder and wetter, more very hot days and nights, more intense downpours of rain and possible increases in storms. All will lead to knock-on impacts. This means that the Council will find it increasingly difficult to 'cope' with impacts in the way it has done in the past. Opportunities will increasingly be outweighed by negative costs.
- Areas considered to be at particular risk include those concerned with:
 - mid-to-long term economic, infrastructure and housing development
 - the built environment, such as community centres and leisure facilities
 - the Councils overall performance assessment (audit)
 - biodiversity
 - health and vulnerable people in the community
- While there are risks to individual services, action at the service level will not be enough in itself to enable the Council to manage its climate risks because action in one area might make it harder for another area (or external party) to adapt. The risks at the corporate level require leadership and commitment because of the uncertainties and time horizons of climate change. For example a very hot summer will affect the Council across the board, not just the services identified as being particularly at risk.
- There are a number of generic and cross-cutting risks to the Council that will affect **all** service provision indirectly:
 - Increased financial cost
 - Office working conditions during hot summers – risk to staff and decreased productivity and efficiency
 - Travel disruption
- Decisions made now will have consequences for how the Council, and more importantly the community, operate, work and live in the future and so must take due consideration of climate change.
- Early action on many of the risks identified will lead to significant savings, demonstrate leadership and enhance the Councils reputation. Many actions should be inexpensive if factored in at the right stage. 'Retrofitting' a building to cope with

very hot summer temperatures is far more costly than designing it in at the planning/drawing stage.

- The Council will already be addressing many of the risks identified in this assessment, although perhaps not with the necessary longer-term perspective. Basing planning decisions on the assumption that Cherwell's past climate will be the same as its future is no longer valid.
- It's important to note that the risks change over time and so continual monitoring is required. This should include monitoring of changes in the risk (Are events occurring more frequently? Are the impacts causing greater damage?), but also evaluating the response (Are our actions effective? What's our threshold for changing our response?)

10.2 Priority Risks

Our analysis has focused on three tiers and the 'very high risk' objectives are summarised here:

- Tier 1 : Strategic,
- Tier 2 : Corporate,
- Tier 3 : Service areas.

1. **Strategic**, we focus on the risks to the wider community via the LSP. All the objectives in the 2020s and 2050s have a low or medium risk (see Table 1.) There are two objectives at very high risk by the 2080s and these are:
 - *'Manage our infrastructure development, matching housing growth with local jobs, transport to work, facilities and services. We will plan effectively for our future workforce and employment patterns, focusing on what we need to achieve in raising our skills and actively attracting the right businesses into the area'.* See section 5.1.1
 - *"Ensure our social infrastructure grows at the same rate as our communities and current deficiencies in provision are addressed including affordable housing, community buildings, open spaces, cultural and leisure opportunities".* See section 5.3.1
2. **Corporate**, we focus on Cherwell District Councils own estate based on the Corporate Plan and Improvement Strategy. All the targets are low or medium risk in the 2020s and 2050s see Table 2. There are three targets at very high risk by the 2080s and these are:
 - *"Complete an employment land assessment and include provision of at least two major new business sites in the Local Development Framework – LDF"* See section 6.1.
 - *"Start construction on Bicester Town Centre Development"* See section 6.2
 - *"Achieve an annual average rate of new homes constructed of 600, of which 100 are affordable"* See section 6.3
3. **Service areas**, we focus on services and functions provided by Cherwell District Council based on the Environmental Service Plan and key delegated powers. In the 2020s and 2050s all objectives are low or medium risk. By the 2080s there are three objectives at high risk and these are:

- *“The management of all Council community facilities”*. See section 7.1
- *“The planting and maintenance of trees on Council-owned land or Council controlled land”*. See section 7.2
- *“Engage residents and businesses to reduce emissions across the district”*. See section 7.3



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