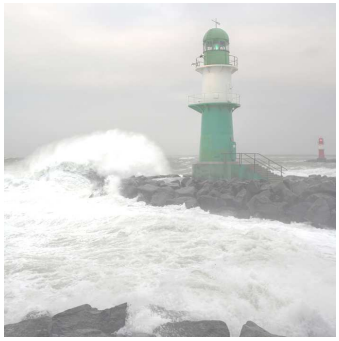
°Climate east midlands
The Regional Climate Change Partnership

East Midlands Planning to Adapt Project

2008 – 2013

NI 188 Risk Assessment Methodology



A regional approach to NI 188, Planning to Adapt to Climate Change

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Assessing Risks using 5x5 Matrix

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Contents

1 Background to the NI 188 Regional Risk Assessment Methodology

The East Midlands regional partnership of local authorities are implementing a common risk assessment methodology for work towards National Indicator NI 188, planning to adapt to climate change. The use of the common risk assessment methodology will ensure a consistent approach to the risk assessments and enable comparisons between local authority service areas within and between local authorities, the delivery of Local Strategic Partnership (LSP) objectives and the services of other LSP partner organisations.

The partnership has selected a 5x5 risk matrix for use during the risk assessments. The partnership has set criteria for the levels of the probability and severity of the consequences of impacts for the risk matrix, see Tables A and B (Annex A & B).

The risk assessments are to be conducted during or based on the results of interviews with service area managers and officers. Where possible a number of staff from each service area should be interviewed, including staff directly involved in delivering the service. This will ensure expert and on the ground knowledge within the organisations are drawn upon during the risk assessments. This should be carried out through:

1. **Individually or in a team meeting within a service area** to identify potential threats and opportunities and assess the risk scores, to the level of scope determined jointly by the service area manager and CAPO.

And, where possible:

2. **An inter-departmental meeting of service area managers in the whole organisation**, in order to engage and to capture knowledge and experience across service areas.

   The service area managers will review the results of the risk assessments from the interviews/team meetings. The managers will be encouraged to comment on the results of the current work and identify any additional threats and opportunities, particularly where there are linkages between service areas. These threats and opportunities are to be assigned risk scores during the meeting through the same method used during the interviews and team meetings and to allow input from other service areas on the impacts they see from outside the service area and the risks for the links between service areas.

   Dependant on the size of the organisation and availability of service area managers, meetings can be set with all service managers within a Department, Directorate or Local Authority.

2 Desk-based Survey of Organisation/LSP Objective Background

Before the CAPOs are to undertake the risk assessment of the climate risks to the organisation and/or LSP objectives, the CAPOs are required to consider/answer the following questions (adapted from Defra 2009) in order to understand the context of the risk assessment within the organisation and/or LSP:

i. What are the organisation's and/or LSP functions, mission, aims and objectives?

ii. Who are the organisation's and/or LSP's "customers"?

iii. What outcomes is the organisation and/or LSP aiming to achieve and over which time periods? (Consider the aims within the time periods of 2020s, 2050s, and 2080s (see below for definitions of time periods)).

iv. What functions, services and/or products do the organisation and/or LSP provide, in what quantities and/or volumes over what time periods (e.g. customers/products/services per year)?

v. What are the principle performance measures for the organisation and/or LSP?

vi. What is the nature and value of the organisation's and/or LSP's assets?

vii. How many people do the organisation employ and/or are involved in work towards the LSP objectives?

viii. How has the size and nature of the organisation and/or LSP objectives changed over the last 10 years?

ix. How are the size and nature of the organisation and/or LSP objectives expected to change over the 2020s, 2050s and 2080s? What are the assumptions this is based on and what are the main uncertainties or potential disruptions to this expected change?

3 Desk-based Survey of Potential Impacts

The CAPOs will initially start the service-specific risk assessment by conducting a desk-based survey of potential threats and opportunities from changes in the climate, through use of the following:

- Results of the LCLIP studies;
- Websites including UKCIP, Defra, Nottingham Declaration websites;
- Previously identified risks relating to weather and climate in current corporate risk assessments.

The CAPOs are to include both **direct** and **indirect** climate impacts. For examples, direct risks may include flooding, temperature, whilst indirect risks may include pollution, health, labour force, behavioural change, social disorder and population migration.

The list of general and service specific impacts and risks are provided in the CAPO Pack for use in the interviews with staff.

4 Screening of Service Areas

All service areas will be screened to ensure assess the potential for high risks relating to weather and climate impacts, to meet the requirement of a comprehensive approach for NI 188. The CAPOs conduct a screening of all service areas to determine the services which are likely to have high threats and opportunities.

The following five questions will be used to screen service areas, scoring on a scale of 0 to 2:

Q1: Does weather directly impact on the service?

Q2: Is the service directly concerned with road networks/ buildings/ soft estate?

Q3: Are roads networks/ buildings/ soft estate used during the service delivery?

Q4: Does the service deal with vulnerable people or critical services?

Q5: Is the service located or operate in any flood risk area(s)?

Scoring Scale: 0 = No / Never; 1 = Maybe / Sometimes; 2 = Yes / Often

The screening of service areas may be conducted by email, telephone or meetings, with the scores and name of the respondent recorded and collated for the organisation.

The results of the screening will be used to determine which service areas will conduct service-specific risk assessments using the NI 188 service area template, and which service areas will be asked to complete generic risk assessments, scoring threats and opportunities which have been identified as applying broadly to all service areas.

To ensure high risk areas have been identified and that potential benefits are identified and take advantage of within service delivery, it is suggested that all service areas complete at minimum a generic risk assessment.

5 Individual Interviews and/or Team Meetings with Service Area Staff

The 5x5 risk matrix and risk assessment template are to be used through the following steps. Please find a copy of the step-by-step instructions for the Council service area in Annex M and a version for the LSP templates. (Please note the Column letters differ between the Council and LSP templates.)

Please Note:

- Specific sections of the template are mandatory (blue), and a number of sections are optional (grey).

- Instructions referring to Column letters are relating to the Template 1a,b,c. Please look for appropriate column letter in other templates.

- Before the completion of the spreadsheet, please refer to the "Instructions for Template Use" and "Template Key" on the first sheet of the template document.

- Please refer to the "How to describe a risk" document in Annex H and please find a worked example of the methodology in Annex I.

a) Timescale

The assessments of the "likelihood of occurrence of the consequence" (i.e. probability) and the "severity of consequence" (i.e. level of affect) of each consequence of each threat and/or opportunity identified are to be made using specified criteria for each timescale appropriate to the service area responsiveness.

During the individual interviews and team meetings the CAPOs will ask for the staff to initially consider the threats and opportunities within all three timescales during risk assessment. The timescales to be considered for each service area are:

- 2020s (2010 – 2039)
- 2050s (2040 – 2069)
- 2080s (2070 – 2099) (based on UKCP09)

The service area managers and officers will be able to determine those timescale(s) relevant to the service area based on the ability of the service to respond rapidly to changes in weather events and climate. This will include consideration of the time required to implement adaptive responses and the length of time the results of decisions will be in place. For example, if a service area is able to respond rapidly (e.g. provision of meals on wheels) you may focus only on the first timescale. However, if a service area is only able to respond in 50 – 100 years (e.g. building a new school) the risk assessment is to be conducted separately for all timescales.

The CAPOs are provided with the following list of timescales for service areas to ensure longer timescales are discussed where it is thought there may be threats and/or opportunities to service areas (Table 1). The CAPOs are to use this list to aid discussions during the interview.

Table 1: Expected timescales appropriate for risk assessment of Council service areas

Service Area	Expected Appropriate Timescales		
	2020s	2050s	2080s
Arboriculture	Y	Y	Y
Land use planning	Y	Y	Y
Corporate property, including schools	Y	Y	Y
Transport planning	Y	Y	Y
Highways fleet	Y	Y	
Public transport	Y	Y	(Y)
Waste disposal (collection with districts)	Y	Y	
Waste collection and disposal	Y	Y	Y
Property	Y	Y	Y
Emergency planning	Y	Y	
Business continuity	Y	Y	
Adult social care	Y		
Streetscene	Y		
Parks, leisure and tourism	Y	Y	
Environmental health	Y		
Pest control	Y		
Infectious disease	Y		
Housing	Y	Y	Y

Please Note: This list is only to be used as an indication to aid discussions with staff.

b) UKCP09 Scenarios

The UKCP09 projections include the results of three sets of greenhouse gas (GHG) emission scenarios; Low, Medium and High[1]:

- Low emissions: IPCC SRES B1
- Medium emissions: IPCC SRES A1B
- High emissions: IPCC SRES A1F1

To incorporate the probabilistic nature of the UKCP09 scenarios and the differences between the three GHG emissions scenarios, UKCIP have provided ranges of climatic variables for the risk assessment.

For details of the UKCP09 projections and key findings, please view Information Sheet 1 UKCP09 Scenarios in Annex A.

c) Scope of Risk Assessment

The Service Area manager will decide the scope (receptor categories; climate change projection timescale; climate variables) for the comprehensive risk assessment, along with the CAPO and line managers. The local authority or LSP partner organisation will be able to assess which levels of change in

[1] Refer to: Climate Change Projections Report (UKCIP 2009a); IPCC Fourth Assessment Report (AR4) (2007); IPCC Special Report on Emissions Scenarios (SRES) (2000).

climate change projections will need to be included within the risk assessment, dependant on the service area and/or objective. For example, buildings may be included within the risk assessment for Property Services, and therefore would not be included in risk assessments for each service area within the Council offices.

Please note:

- At this stage we are completing the first risk assessment of all service areas and/or objectives. It will be necessary to revise the risk assessments for areas in which high risks are identified to investigate this in more detail. During this risk assessment, we will not be attempting to undertaken an assessment to the level of detail of the 3 Counties Alliance Partnership (3CAP) Highways Project.
- At this stage the combined effect of more than one impact is not being investigated. This will be investigated within the development of the adaptation action plan resulting from NI 188.
- The first completion of the risk assessments will not include the impacts of trigger points or thresholds, due to the uncertainty in the estimation of values for each and the lack of consistent definitions. Where risks are identified as “very high” or “high” (Table D Annex D), current evidence of trigger points and thresholds will need to be reviewed when considering adaptation options.

Please Note: For sections d) to g) the LSP objectives instructions are in Annex M due to differences in Column letter references.

d) Identification of Risks

During the interview and/or team meeting with the service area manager and officers, the CAPOs are to identify and score the threats and/or opportunities to the service area and/or LSP objective. The CAPOs will use the list of potential threats and opportunities and impacts provided in the CAPO Pack during the interview to aid risk identification. **Please Note:** the list provided is not exhaustive. The CAPOs are encouraged to ask staff for ideas of any further threats and/or opportunities.

For each service/LSP objective, the CAPOs are to:

i. Work through the future climatic conditions (Column B) and corresponding impact categories (Column C) to identify conditions and impacts which are expected to affect the service area.

Definitions of Impacts: There exist various definitions of certain weather-related impacts, for example, heat waves can be defined as a period of over five consecutive days with daily maximum temperatures of 5^{o}C or more above the average maximum temperature, as recommended by the World Meteorological Organisation (Frich *et al.* 2002). Due to the use of absolute differences from average temperatures to classify heat waves, the inconsistencies in the availability of definitions for weather

events and the effect of differences in locations, for this stage of the NI 188 risk assessment the range of values from the UKCP09 scenarios will be used rather than definitions of specific impacts. Please refer to the Glossary for definitions used within this project.

ii. Identify the threats and/or opportunities (Column D) to the service area which have the potential to disrupt service delivery resulting from the impact and the projected future climatic conditions.

iii. Identify the consequences (Column E) of each threat and/or opportunity by considering the relevant receptor categories (Column F) separately, i.e. who or what is affected by the consequence.

iv. Identify who or what is affected (the receptor category) (Column F) for each consequence from the drop-down menu.

Please Note:

- There may be more than one receptor per consequence, please enter each receptor as a separate row to enable to the assessment of the impact of the threat and/or opportunity on each receptor separately.

v. Assign a reference number to each row of the template in the "Id Ref" (Column A & R), distinguishing between different receptors (roman numerals), different consequences (letters) and different threats and/or opportunities (numbers). For example, the 1st receptor of the 1st consequence of the 1st identified threat or opportunity would be referenced as 1ai; the 2nd receptor of the 1st consequence of the 1st threat or opportunity as 1aii; the 1st receptor of the 2nd consequence of the 2nd threat or opportunity as 2bi.

vi. Identify any current measures in place which will reduce the likelihood of the occurrence of the consequence and/or the severity of the consequence (Column G).

e) Assessment of Scores of Likelihood & Severity

For each receptor of each consequence, please complete the following:

i. Confirm timescales to be considered (Columns H to P)

ii. Assess "likelihood of occurrence of consequence" score using **Table A (Annex A)** for each timescale separately (Column H to J), entering the score (1 – 5) from the drop-down menu into the risk assessment template and noting reason for assignment in notes column (Column S).

iii. Assess "severity of the consequence of the threat or opportunity" score using **Table B (Annex B)** for each timescale separately (Column K to M), entering the score (1 – 5) from the drop-down menu into the risk assessment template and noting reason for assignment in notes column (Column S).

Please Note:

- The assessment of (ii) and (iii) are to be conducted separately. For (ii) please consider the likelihood of occurrence of the consequence, regardless of the severity of the consequence. For (iii) please consider the severity of consequence, regardless of the likelihood of occurrence of the consequence.
- Please consider the current state of the service assets and systems when completing the risk assessment to identify the **Residual Risk** (See Glossary). For example, consider the current state of insulation and air circulation in buildings when assessing the impact of heat waves.
- The reason for the assignment of the score for each is to be noted in the risk assessment notes column in the template. This is essential to enable comparison of assignments in regional review of the assessment and to inform future reviews of the risk assessment. The definitions for probability of occurrence are quite short. However, because the impact (consequence) of the risk, should it occur, can be much wider, we have a more comprehensive set of definitions.

f) Calculation of Risk Score

The score levels assigned to the "likelihood of consequence" and "severity of impact" are multiplied to provide the risk score:

Risk Score = Likelihood of Consequence x Severity of Impact

i. The template has been set up to automatically calculate the risk score in the appropriate timescale column (Column N – P). Please view the 5x5 risk matrix (**Table C Annex C**) to see the relation between the "likelihood of consequence", "severity of impact" and risk number scores. **Please Note: initially the cells for the Risk Score are to be filled in as green**, as the cells will only change to yellow, orange and red automatically due to the limit of 3 categories in the conditional format.

ii. Match the risk score to the risk category in (**Table D Annex D**) and colour the risk score box in the appropriate colour for the category.

iii. Indicate whether the consequence is a threat or an opportunity by selecting either the "-" or "+" sign, respectively (Column Q).

g) Optional Information

Within the risk assessment template a number of columns are optional (Columns T – Z; in grey). Please Note: The additional information gathered in these columns will inform the development of the Adaptation Action Plan, during work towards higher levels of NI 188. Therefore, where possible, please fill in the additional columns where the information is highlighted in the interviews and/or available through previous work. Where information is

provided on costs (Column U) and resource requirements (Column V, a drop-down menu), please note the accuracy of the information (e.g. expected range, estimate, initial quote, final quote).

h) Date to Review Risk Rating

The risk assessments of vulnerability of service areas and/or objectives will need to be reviewed on a regular basis. For each service area and/or LSP objective, please indicate the review period for the risk assessment (top right on template). The timing of review of the risk assessments should consider:

- ability of the service and/or LSP objective to respond to changes in weather events and climate (response time)
- timing of decision-making processes, policy reviews and investment in the organisation
- required implementation period for adaptive responses
- length of time the results of decisions will be in place
- projected changes in climate
- implementation of adaptive responses

The risk assessment for NI 188 is based on the projected changes in climatic variables provided by UKCIP from the UKCP09 scenarios. Upon the release of future updates and scenarios from UKCIP, the risk assessments will be reviewed where there are differences in the projected changes of the climate variables which are likely to alter the relative assignment of risk levels and priority areas for action.

Where possible, it would be beneficial to include the NI 188 risk assessments within the risk assessments conducted as part of the annual or 6-monthly review of the Strategic Delivery Plans, in order to embed climate change adaptation in to the organisation's processes.

During the next review of the risk assessments, it is suggested that the threats and opportunities resulting in impacts relating to mental health of staff, customers/citizens and society in general (social/people category) be considered, due to the addition of a scale of mental health-related issues within Table B in March 2010.

i) Summarising the Risk Assessments

Upon the completion of the risk assessment, a summary table can be filled in for the organisation identifying areas with High, Medium and Low risks (Table 2). The tables are to be produced separately for each time period for the organisation and/or LSP objectives (2020s, 2050s, 2080s).

Within the risk assessment template, a sheet is provided to collate the risk level assignments across the local authorities, LSP objectives, LSP organisations and all NI 188 risk assessments across the region (Please see Sheets 1c, 2d, 4d & 5, respectively). These templates will be completed during the peer-review exercise, and amended as required.

Table 2: Summary of Climate Change Risks within Organisation for the 2020s (Example)

Business Area			Climate Change Risk							
			Heatwave	Flooding	etc..					
	Community Services	Environmental Health	H	M						
		Health & Safety	M	L						
		Building Control	L	M						
		Development Control	L	M						
		etc…	etc..	etc..						
	CYPS	Education								
		Inclusion								
	ASSHH	etc…								
	Corporate Services	etc…								
	Development	etc…								

Please Note: names and figures in this example are fictional

6 Peer-Review of Service Area & LSP Objective Risk Assessments (December 2009)

Following the risk assessment of service areas and LSP objectives, the partnership will review the risk assessments across all local authorities and/or LSP objectives and/or LSP partner organisations to ensure consistency in the assignment of levels of risk probability and impact.

The peer-review panel will include the local authority line managers and officers conducting the risk assessments, the CAPOs, the Co-ordinator of Climate East Midlands (Regional Climate Change Partnership) and where available representatives from EMIEP and UKCIP. The Co-ordinator of Climate East Midlands will chair the peer-review workshop.

The review could take a 10% sample of the risks identified for each of the four risk level categories: Very High, High, Medium, and Low (Table D Annex D). The assigned risk levels of the 10% sample would be compared across all local authorities/LSPs for individual receptors, consequences and threats and opportunities. The next steps would be dependant on the findings of the comparison:

- If the risk levels have been assigned consistently, the reviewers would assume that all risk levels (Table C Annex C) have been assigned using the matrix in a consistent manner across the region, and no further risks would be reviewed.

- If the same or similar consequences on the same receptors in similar conditions are assigned risk numbers (Table C Annex C) which mean that they are assigned to different risk categories (Table D Annex D), all risk assignments would be reviewed. This may be undertaken through division of the identified risks into subgroups of the peer-review panel.

An alternative method of review would be to collate the scores for similar threats and opportunities in one template sheet and compare the scoring to determine if there are threats and/or opportunities which have been scored differently where there is not a valid reason for differing scores, taking note of differences between local authority areas. The method of review will be selected during the project.

7 Risk Descriptions

For each threat or opportunity identified as a Very High Risk or a High Risk, the organisation will complete a Risk Description based on the ALARM Risk Management Standard 2002 (Table 3, Page 12). The template for the Risk Description will be developed during the project.

Table 3: Risk Description from the ALARM Risk Management Standard (Extract 2002)

1. Name of Risk	
2. Scope of Risk	Qualitative description of the events, their size, type, number and dependencies
3. Nature of Risk	Eg. Strategic, operational, financial, knowledge or compliance
4. Stakeholders	Stakeholders and their expectations
5. Quantification of Risk	Significance and Probability
6. Risk Tolerance/ Appetite	Loss potential and financial impact of risk Value at risk Probability and size of potential losses/gains Objective(s) for control of the risk and desired level of performance
7. Risk Treatment & Control Measures	Primary means by which the risk is currently managed Levels of confidence in existing control Identification of protocols for monitoring and review
8. Potential Action for Improvement	Recommendations to reduce risk
9. Strategy and Policy Developments	Identification of function responsible for developing strategy and policy

(Extract from Table 4.2.1 – Risk Description. ALARM 2002)

8 Adaptation Action Plan

The results of the risk assessment are to be used to develop the NI 188 Adaptation Action Plan. The regional methodology for the development of the Adaptation Action Plan will be developed following the completion of the risk assessments.

a) NI 188 Level 2 Criteria

In order to achieve Level 2 of National Indicator, NI 188, is it necessary to begin to identify adaptation measures and begin to put in place adaptive measures by the end of March 2010. It will therefore be beneficial to complete the optional (grey) sections of the template where information is discussed during the interviews. For further information, please refer to the guidance document for NI 188 (LRAP 2009).

b) Categorisation of Climate Risks

Following the assignment of risk scores the threats and opportunities are grouped into Very High, High, Medium and Low risks based on the matrix score and colour (Column O - Q) (**Table D Annex D**). Each very high or high risk can be further categorised into the groups outlined in Table 4.

Table 4: Categorisation of Risks (Categories from Defra 2009)

Risk Type	Category Assignment	
• Physical risk	• Yes	• No
• Operational risk	• Extrinsic • Intrinsic	• Regulatory • Liability
• Timing / Duration	• Sudden • Gradual	• Transitory • Persistent
• Impact	• Direct	• Indirect

Definitions of the risk type categories will be developed during the project to ensure consistency across the region.

c) Comparison to Corporate Risk Assessment

The NI 188 LRAP guidance (2009) suggests organisations compare the risk scores from NI 188 risk assessments to their own corporate risk register. This process will enable the priority of the threats and opportunities identified relating to weather and climate events to be compared to the priority of other risks the organisation is exposed to. This information can be utilised in the organisation's decision-making processes, particularly in relation to the current and future allocation of financial and human resources.

The NI 188 risk assessment methodology and template were developed based on the Rutland County Council Corporate Risk Strategy, the Derbyshire County Council Risk and Issues Management Approach and the Leicester Adaptation Action Plan, in addition to other risk assessment methodologies. Due to the basis of the methodology on local authority risk assessment methodologies, it is expected that the resulting risks identified and scored will be comparable to those identified and scored through the organisation's corporate risk assessment method.

In order to compare the scores from the NI 188 risk assessment and the organisation's own corporate risk assessment the following steps are to be followed:

1. Compare and match the scoring categories of the NI 188 (Annex C & D) and corporate methodologies by comparing the scoring matrices, to produce a **conversion matrix** to convert scores between the risk assessment methodologies.

2. Convert the NI 188 scores (of likelihood and severity separately) into scores from the corporate methodology using the conversion matrix.

3. Compare the risk categories of the NI 188 methodology (Very High, High, Moderate and Low, see Annex C & D) and the corporate methodology.

4. Compare the categories of "who or what might be affected" (Column F of the service area template, Annex O) within the NI 188 methodology to the categories used during the corporate risk assessments. Where there are differences in the categories considered during the risk assessments, e.g. where there are categories within the corporate methodology which are not included within the NI 188 methodology, it may be advisable to assess the potential impact of the threats and opportunities identified on the additional group(s) and to identify and score any additional threats and opportunities resulting from the weather and climate types considered within the NI 188 risk assessment.

5. Where the risk scores under the two methodologies lead to similar categorisation of the risks, e.g. risks considered as high priorities for immediate action within the corporate methodology match to "Very High" risks within the NI 188 methodology, it may be assumed that risks identified and scores using the NI 188 methodology are comparable directly to risks identified and scored using the corporate risk assessment methodology, once the NI 188 scores are converted into corporate scores using the conversion matrix.

Please Note: Where the corporate risk assessment methodology greatly differs from the NI 188 risk assessment methodology, including in terms of the levels of scoring for the likelihood and severity of the threat or opportunity and the potential impact groups which are considered, it is advisable to use the corporate risk assessment methodology to identify and score the risks relating to weather and climate, in order to compare the scoring of the risks identified through the NI 188 methodology to other corporate risks.

9 Resources

Department for Energy and Climate Change (DECC)
Government department designated with energy efficiency, renewable energy and climate change: http://www.decc.gov.uk/

Department for Environment, Food and Rural Affairs (Defra)
Government department designated with climate change adaptation: http://www.defra.gov.uk/environment/climatechange/index.htm

Intergovernmental Panel on Climate Change (IPCC)
Panel of international scientists: http://www.ipcc.ch/

Nottingham Declaration on Climate Change
Nationally recognised pledge Local Authorities can sign to make a commitment to their local community to address the causes and consequences of climate change:
http://www.energysavingtrust.org.uk/nottingham

UK Climate Impacts Programme (UKCIP)
UK organisation funded to facilitate the transfer of knowledge of climate change impacts between research and academia to organisations and businesses: http://www.ukcip.org.uk/

UKCP09 Defra (Introduction)
Introductory information about the UKCP09 climate change scenarios:
http://ukcp09.defra.gov.uk/

UKCP09 Scenarios (Technical Information)
Website including publications and data aimed at audiences including awareness raising campaigns, decision-makers and officers requiring data on specific climate variables over specified time and spatial scales. Data and reports are arranged into key messages, pre-defined maps, publications and access to the full scenario data and the weather generator:
http://ukclimateprojections.defra.gov.uk/

UKCP09 E-learning via Moodle
Sign up to the tool to access the E-learning facility, which provide guidance through the generation of data requests to the interpretation of data:
http://moodle.ukcip.org.uk/login/index.php

10 References

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Defra 2009. Adapting to Climate Change: ensuring progress in key sectors Consultation on the Adaptation Reporting Power in the Climate Change Act 2008 http://www.defra.gov.uk/corporate/consult/climate-change-adapting/index.htm. Last accessed 07.09.09.

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Data Sources:

UKCP09 Scenarios: Please note data supplied by Laurie Newton, UKCIP. For further details and full data sets, please visit sites listed in Resources (Section 10).

Observations 1961 – 1990: Data available from the Met Office under the "UKCP09: Gridded observation data sets" at http://www.metoffice.gov.uk/climatechange/science/monitoring/ukcp09/.

11 Glossary

Adaptation

Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. Various types of adaptation can be distinguished:

- **Planned adaptation** is the result of a deliberate policy decision, based on an awareness that conditions have changed or are about to change, and that action is required to maintain, or achieve, a desired state.
- **Reactive adaptation** is adaptation that takes place in response to the consequences of a particular event.
- **Anticipatory adaptation** is that which takes place before impacts of climate change are observed
- **Spontaneous (or autonomous) adaptation** does not constitute a conscious response to climatic stimuli, but is triggered by ecological changes in natural systems, and by market or welfare changes in human systems. (UKCIP 2009)

Adaptation assessment

The practice of identifying options to adapt to climate change and evaluating them in terms of criteria such as availability, benefits, costs, effectiveness, efficiency and feasibility. (UKCIP 2009)

Adaptation to climate change

Actions to reduce the vulnerability of a system to the negative impacts of anticipated human-induced climate change. (UKCIP 2009)

Adaptation to climate variability

Involves taking action to reduce vulnerability to short-term climate shocks. Often, adaptation to climate variability will also result in adaptation to climate change. The objective of adaptation is to reduce vulnerability to climate change and variability, and enhance the capability to capture any benefits of climate change. (UKCIP 2009)

Adaptation measures

Refer to actual adjustments, or changes in decision environments, which might enhance resilience or reduce vulnerability to observed or expected changes in climate. (UKCIP 2009)

- **No-regrets** options will deliver benefits that exceed their costs, whatever the extent of climate change. These should always be implemented where they exist. For instance, if you are already experiencing weather-related problems, then cost-effective actions to deal with them should be *no regret* options. No regret options are particularly suitable for the near term as they can deliver obvious and immediate benefits, and can provide experience on which to build further climate risk assessments. See the BRAIN for examples of such options.

- **Low-regrets** options yield large benefits for relatively low costs and seek to maximise the return on investment when certainty of the associated risks is low. See the BRAIN for examples of such options.

- **Win-win** options enhance your adaptive capacity (ie. they reduce climate risks and exploit positive opportunities) whilst also contributing to the achievement of other social, environmental or economic outcomes. See the BRAIN for examples of such options.

- **Flexible or adaptive management** options are important means of for handling uncertainties. Flexible management involves putting in place incremental adaptation options, rather than undertaking large-scale adaptation in one step, making the best decision at each decision point and reviewing the performance of previous decisions. A decision to **delay** the implementation of an adaptation measure can also be a legitimate risk management strategy. Delaying can buy time for further information gathering (BAC), and can help reduce the risk of under- or over-adapting as better information on climate risk may become available, allowing you to make a better informed decision. See the BRAIN for examples of such options.

- **Conscious decision *to do nothing*** is the most basic response but MAY be legitimate and appropriate in the case of low priority impacts or in situations where climate risks are outweighed by non-climate factors. It may also be appropriate for more significant impacts where no obvious adaptation response can be clearly identified, or where there are prospects that other factors may change future circumstances. However, a decision to *do nothing* should not be the default position, and should only be reached after careful consideration of your climate risks and adaptation options. Such a decision must also be continually monitored and reviewed to ensure nothing has changed that requires you to change your position. (UKCIP 2009b)

Adaptive capacity

Inherent capacity of a system or population to adjust to climate climate impacts or climate change, to moderate potential damages, exploit opportunities, and cope with the consequences. (UKCIP 2009)

Baseline/reference

The baseline (or reference) is the state against which change is measured. It might be a 'current baseline', in which case it represents observable, present-day conditions. It might also be a 'future baseline', which is a projected future set of conditions excluding the driving factor of interest. Alternative interpretations of the reference conditions can give rise to multiple baselines. (IPCC WGII 2007)

Central estimate

The level at which half of possible outcomes lie above and half below; often referred to as the median. (Met Office 2009)

Climate

Climate in a narrow sense is usually defined as the 'average weather', or more rigorously, as the statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands or millions of years. These quantities are most often surface variables such as temperature, precipitation, and wind. Climate in a wider sense is the state, including a statistical

description, of the *climate system*. The classical period of time is 30 years, as defined by the World Meteorological Organization (WMO). (IPCC WGII 2007)

Climate change

Climate change refers to any change in *climate* over time, whether due to natural variability or as a result of human activity. This usage differs from that in the *United Nations Framework Convention on Climate Change (UNFCCC)*, which defines 'climate change' as: 'a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global *atmosphere* and which is in addition to natural climate variability observed over comparable time periods'. See also *climate variability*. (IPCC WGII 2007)

Climate change risk

Additional risk to investments (such as buildings and infrastructure) and actions from potential climate change impacts. (UKCIP 2009)

Climate prediction

A climate prediction or climate forecast is the result of an attempt to produce an estimate of the actual evolution of the climate in the future, e.g., at seasonal, inter-annual or long-term time scales. See also *climate projection* and *climate (change) scenario*. (IPCC WGII 2007)

Climate projection

The calculated response of the *climate system* to *emissions* or concentration *scenarios* of *greenhouse gases* and *aerosols*, or *radiative forcing scenarios*, often based on simulations by *climate models*. Climate projections are distinguished from *climate predictions*, in that the former critically depend on the emissions/ concentration/*radiative forcing* scenario used, and therefore on highly uncertain assumptions of future socio-economic and technological development. (IPCC WGII 2007)

Climate change scenario

A plausible and often simplified representation of the future *climate*, based on an internally consistent set of climatological relationships and assumptions of *radiative forcing*, typically constructed for explicit use as input to climate change impact models.A'climate change scenario' is the difference between a climate *scenario* and the current climate. (IPCC WGII 2007)

Consequence – the end result or effect caused by a situation or event. In order to undertake a risk assessment, it is necessary to make a quantitative, or qualitative, estimate of the magnitude of the consequence(s) of an event. Note that there will typically be a range of consequences for different receptors affected by a weather event or the impact of a climate change. (LRAP 2009)

Drought

The phenomenon that exists when precipitation is significantly below normal recorded levels, causing serious hydrological imbalances that often adversely affect land resources and production systems. (IPCC WGII 2007)

Emission scenarios

A plausible representation of the future development of emissions of substances that are potentially radiatively active (e.g., *greenhouse gases*, *aerosols*), based on a coherent and internally consistent set of assumptions about driving forces (such as demographic and socio-economic development, technological change) and their key relationships. In 1992, the IPCC presented a set of emissions scenarios that were used as a basis for the *climate projections* in the SecondAssessment Report. These emissions scenarios are referred to as the IS92 *scenarios*. In the IPCC Special Report on Emissions Scenarios (*SRES*) (Nakićenović et al., 2000), new emissions scenarios – the so-called SRES scenarios – were published. (IPCC WGII 2007)

Extreme weather event

An event that is rare within its statistical reference distribution at a particular place. Definitions of 'rare' vary, but an extreme weather event would normally be as rare as or rarer than the 10th or 90th percentile. By definition, the characteristics of what is called 'extreme weather' may vary from place to place. Extreme weather events may typically include floods and *droughts*. (IPCC WGII 2007)

Flooding

Fluvial
Fluvial Flooding, this resulting from water overflowing from watercourses. A watercourse is anything that conveys or may from time to time convey water that is not a sewer. This rivers, burns, ditches, culverts, canals and aqueducts are all watercourses whether open or piped. Fluvial flooding generally results from rainfall with critical rainfall characteristics varying with the size of catchment. Snow melt may contribute. (Riddel 2004)

Pluvial
Pluvial Flooding. This is the name now being given to flooding resulting directly from rainfall. It will be localised in effect and will appear as water flowing over ground, off fields and so on. It is a particular problem with the introduction of barrier free access requirements for new buildings. (Riddel 2004)

Hazard

The potential threat to people and the things they value. Environmental events become hazards once they threaten to affect society and/or the environment adversely. (AAG: http://www.aag.org/HDGC/www/hazards/glossary/glossary.html - Tomkpins, e. 2009)

The Met Office lists hazardous weather events to be flooding, extreme heat, storminess, subsidence, ice/ snow:

	Temperature	Rainfall	Snowfall	Soil moisture	Storm surge	Sea level
Flooding		x			x	x
Extreme heat	x					
Storminess					x	x
Subsidence	x			x		
Ice/ snow	x		x			

(Met Office 2009b)

Heat island

An urban area characterised by ambient temperatures higher than those of the surrounding non-urban area. The cause is a higher absorption of solar energy by materials of the urban fabric such as asphalt. (IPCC WGII 2007)

Heatwave

Heatwaves can be defined as a period of over five consecutive days with daily maximum temperatures of 5^{o}C or more above the average maximum temperature, as recommended by the World Meteorological Organisation (Frich *et al.* 2002). Due to the use of absolute differences from average temperatures to classify heatwaves, the inconsistencies in the availability of definitions for weather events and the effect of differences in locations, for this stage of the NI 188 risk assessment the range of values from the UKCP09 scenarios will be used at present rather than definitions of specific impacts. (NI 188 Risk Assessment methodology 2009)

Ignorance

"This applies in circumstances where there not only exists no basis for the assigning of probabilities (as under uncertainty), but where the definition of a complete set of outcomes is also problematic. In short, it is an acknowledgement of the possibility of surprises. Here, it is not only impossible to rank the options but even their full characterisation is difficult. Under a state of ignorance (in this strict sense), it is always possible that there are effects (outcomes) which have been entirely excluded from consideration" (Stirling, 1999: 17 –> Tompkins, E. 2009)

Impact

The effects of *climate change* on natural and *human systems*. Depending on the consideration of *adaptation*, one can distinguish between potential impacts and residual impacts:

- **Potential impacts**: all impacts that may occur given a projected change in climate, without considering adaptation.

- **Residual impacts**: the impacts of climate change that would occur after adaptation. See also *aggregate impacts*, *market impacts*, and *non-market impacts*. (IPCC WGII 2007)

Intense rainfall days

An intense rainfall amount is the value reached that provides the uppermost 10% (or 90th quantile) of the total seasonal precipitation. (UKCIP 2009)

LCLIP

Local Climate Impacts Profile is a resource that Local Authorities can compile so that they better understand their exposure to *weather* and *climate*. It is based on evidence of a locality's vulnerability to recent severe weather events and in particular how these events affected a local community as well as the authority's assets and capacity to deliver services. (LRAP, 2009)

LRAP

Local and Regional Adaptation Partnership Board – a joint partnership of various local and regional organisations (UKCIP, Environment Agency, Natural England, Nottingham Declaration, Local Government Association, Government Offices, Regional Development Agencies, Local Strategic Partnerships, Regional Climate Change Partnerships and Defra) chaired by Government Office for London who have come together to support delivery of adaptation at the local and regional level. Details of the Board and its programme of work can be obtained via the Government Offices. (LRAP, 2009)

Likelihood

The likelihood of an occurrence, an outcome or a result, where this can be estimated probabilistically, is expressed in this Report using a standard terminology, defined in the Introduction. See also *uncertainty* and *confidence*. (IPCC WGII 2007)

Table 4. Likelihood Scale.

Terminology	Likelihood of the occurrence/ outcome
Virtually certain	> 99% probability of occurrence
Very likely	> 90% probability
Likely	> 66% probability
About as likely as not	33 to 66% probability
Unlikely	< 33% probability
Very unlikely	< 10% probability
Exceptionally unlikely	< 1% probability

(IPCC WGI 2007)

Mitigation

An *anthropogenic* intervention to reduce the anthropogenic forcing of the *climate system*; it includes strategies to reduce *greenhouse gas sources* and emissions and enhancing *greenhouse gas sinks*. (IPCC WGII 2007)

NI188

Rationale

To ensure local authorities are sufficiently prepared to manage risks to service delivery, the public, local communities, local infrastructure, businesses and the natural environment from a changing climate, and to make the most of new opportunities. The indicator measures progress on assessing and managing climate risks and opportunities, and incorporating appropriate action into local authority and partners' strategic planning. The impacts might include increases in flooding, temperature, drought and extreme weather events. These could create risks and opportunities such as: impacts to transport infrastructure from melting roads or buckling rails, increases in tourism, increased damage to buildings from storms, impacts on local ecosystems and biodiversity, scope to grow new crops, changing patterns of disease, impacts on planning and the local economy and public health.

Level 0: Getting Started

The Authority has begun the process of assessing the potential threats and opportunities across its estate and services (for example, flood and coastal resilience plans, emergency planning, community risk registers/strategies etc) and has identified and agreed the next steps to build on that assessment in a systematic and coordinated way.

Level 1: Public commitment and impacts assessment; Assembling and evidence base

The Authority has made a public commitment to identify and manage climate related risk. It has undertaken a local risk-based assessment of significant vulnerabilities and opportunities to weather and climate, both now and in the future. It can demonstrate a sound understanding of those not yet addressed in existing strategies and actions (e.g. in land use planning documents, service delivery plans, flood and coastal resilience plans, emergency planning, community risk registers/strategies etc). It has communicated these potential vulnerabilities and opportunities to department/service heads and other local partners and has set out the next steps in addressing them.

Level 2: Comprehensive risk assessment (with prioritised action in some areas)

The Authority has undertaken a comprehensive risk based assessment of vulnerabilities to weather and climate, both now and in the future, and has identified priority risks for its services. It has identified the most effective adaptive responses and has started incorporating these in council strategies, plans, partnerships and operations (such as planning, flood management, economic development, social care, services for children, transport etc). It has begun implementing appropriate adaptive responses in some priority areas. In its role as a community leader the council has started working with its LSP encouraging identification of major weather and climate vulnerabilities and opportunities that affect the delivery of the LSP's objectives

Level 3: Comprehensive action plan (and prioritised action in priority areas)

The Authority has embedded climate impacts and risks across council decision making. It has developed a comprehensive adaptation action plan to deliver the necessary steps to achieve the existing objectives set out in council strategies, plans, investment decisions and partnership arrangements in light of projected climate change and is implementing appropriate adaptive responses in all priority areas. This includes leadership and support for LSPs in taking a risk based approach to managing major weather and climate vulnerabilities/opportunities across the wider local authority area.

Level 4: Implementation, monitoring and continuous review

The Authority and LSP are implementing the comprehensive adaptation action plan across the local authority area, and there is a robust process for regular and continual monitoring and review to ensure progress with each measure and updating of objectives. The Authority and LSP are taking appropriate adaptive responses.
(LRAP, 2009)

Percentile

The value below which falls a specified percentage (e.g. 90%) of a set of values. The 10th and 90th percentile values are commonly used to define the thresholds for extreme events. For example, the 90th percentile daily-average temperature is that which is exceeded on only one day in ten. Also see quantile. (UKCIP 2009)

Probabilistic projections

Probabilistic projections assign a probability to different possible climate change outcomes, recognising that (a) we cannot give a single answer and (b) giving a range of possible climate change outcomes is better, and can help with making robust adaptation decisions, but would be of limited use if we could not say which outcomes are more or less likely than others. (UKCIP09 2009)

Projection

The potential evolution of a quality or set of quantities, often computed with the aid of a model. Projections are distinguished from predictions in order to emphasise that projections involve assumptions – concerning, for example, future socio-economic and technological developments, that may or may not be realised – and are therefore subject to substantial *uncertainty*. See also *climate projection* and *climate prediction*. (IPCC WGII 2007)

Receptors

Represent important aspects of the exposure unit. In some cases, the exposure unit and receptor may be synonymous. (UKCIP 2009)

Risk
is a function of two variables: the probability of an impact and the magnitude of an impact – both of which are known (Stirling, A. 1999 – Tompkins, E. 2009)

Risk based adaptation approach

Pedigree: developed from "Hazards approach" or "the Hazards paradigm"
Aim: to manage the technological and environmental hazards facing society (Burton, et al. 1993; White 1986).
Approach: identifying the most significant climatic drivers affecting a place or economic sector, estimating the probability of exposure and likelihood of damage (risk) and assessing the most cost-effective and expedient means of reducing that risk to a level perceived as tolerable to the society exposed.
Policy focus: driven by known risks, or risks to which a certain degree of certainty can be calculated, and thus has an advantage of political expediency and the appearance of economic efficiency
(Tompkins, E. 2009)

Residual risk

The risk that remains after risk management and adaptation to (e.g.) climate. (UKCIP 2003 – NI 188 Risk methodology).

Risk assessment

The structured analysis of hazards and impacts to provide information for decision making. Risk assessment usually relates to a particular *exposure unit* which may be individual, population, infrastructure, building or environmental asset etc. The process usually involves identifying hazards that could have an impact, assessing the likelihoods and severities of impacts, and assessing the significance of the risk, which is usually related to the probability multiplied by the severity of the impact. (UKCIP 2009)

Scenario

A plausible and often simplified description of how the future may develop, based on a coherent and internally consistent set of assumptions about driving forces and key relationships. Scenarios may be derived from *projections*, but are often based on additional information from other sources, sometimes combined with a 'narrative storyline'. See also *climate (change) scenario*, *emissions scenario* and *SRES.* (IPCC WGII 2007)

SRES

The storylines and associated population, *GDP* and *emissions scenarios* associated with the Special Report on Emissions Scenarios (SRES) (Nakićenović et al., 2000), and the resulting *climate change* and *sea-level rise scenarios*. Four families of *socio-economic scenario* (A1, A2, B1 and B2) represent different world futures in two distinct dimensions: a focus on economic versus environmental concerns, and global versus regional development patterns. (IPCC WGII 2007)

Uncertainty

An expression of the degree to which a value (e.g., the future state of the *climate system*) is unknown. Uncertainty can result from lack of information or from disagreement about what is known or even knowable. It may have many types of sources, from quantifiable errors in the data to ambiguously defined concepts or terminology, or uncertain *projections* of human behaviour. Uncertainty can therefore be represented by quantitative measures (e.g., a range of values calculated by various models) or by qualitative statements (e.g., reflecting the judgement of a team of experts). See also *confidence* and *likelihood*. (IPCC WGII 2007)

Threshold

The level of magnitude of a system process at which sudden or rapid change occurs. A point or level at which new properties emerge in an ecological, economic or other system, invalidating predictions based on mathematical relationships that apply at lower levels. (IPCC WGII 2007)

Vulnerability

Vulnerability is the degree to which a system is susceptible to, and unable to cope with, adverse effects of *climate change*, including *climate variability* and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its *sensitivity*, and its adaptive capacity. (IPCC WGII 2007)

Weather

Refers to the state of the atmosphere with regard to temperature, cloudiness, rainfall, wind, and other meteorological conditions. (UKCIP 2009)

Wider range

The wider range as referred to in the 'Key findings all scenarios' refers to the range of probabilistic projections that fall between the 10th Percentile of the low emissions scenario and the 90th Percentile of the high emissions scenario.

Glossary Sources

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Annex A Likelihood of Consequence Definition

Table A: Description and definitions of PROBABILITY or likelihood of the consequence of the threat or opportunity occurring

Description	Descriptor	Probability (%)	Scale / Level
May occur only in exceptional circumstances	Highly unlikely	0 – 20%	1
Fairly likely to occur at some time, or in some circumstances	Reasonably likely	21 – 40%	2
Equal chance of occurring or not occurring	Even chance	41 – 60%	3
Will probably occur at some time, or in most circumstances	Highly likely	61 – 80%	4
Is expected to occur in most circumstances	Almost certain	81 – 100%	5

Please Note: The descriptor and probability have been taken from Rutland County Council's Health & Safety risk assessment methodology.

Annex B Severity of the Consequence Definition

The categories of receptors considered within the NI 188 risk assessment are:

- Assets or Property
- Environmental
- Legislative
- Professional/Managerial
- Technological
- Contractual/Supplier
- Financial
- Logistics/Infrastructure
- Reputation
- Customer/Citizen
- Governance
- Partnership/Contractual
- Social/people
- Economic
- Legal
- Political
- Staff

During the risk assessment, the consequence is assigned a level of severity based on the qualitative scales of severity categories listed in Table B. In the assessment, the threat or opportunity is assigned the highest severity level of all the categories, whilst the consequence on each receptor category is scored separately. **Please note:** The level of impact is to be assessed based on the assumption that the threat or opportunity does occur.

The receptor categories listed next to the consequence levels are given as an indication of potential areas affected. Table B includes examples of scoring levels for threats only; opportunities should be scored using a similar scale.

Table B: Description and Definitions of Severity of the Consequence of the Threat or Opportunity, assuming the consequence occurs

Possible Receptor Category	1	2	3	4	5
"Who or What is Affected"	Insignificant	Minor	Moderate	Major	Catastrophic
Professional/Managerial; Reputation; Partnership/Contractual; Political	No or insignificant disruption to internal business. No loss of service delivery. No effect on LSP objectives.	Minor disruption to internal business only. No loss of service delivery. No effect on LSP objectives.	Moderate disruption to service/objective, which would affect customers (loss of service delivery for no more than 48 hours) and/or delivery of LSP objectives.	Major disruption to service/objective, with serious damage to organisation's ability to deliver services (loss of service delivery for more than 48 hours but less than seven days) and/or damage to ability to deliver LSP objectives.	Service/objective unlikely to survive, or loss of service delivery and/or LSP objective delivery for more than 7 days.
Legislative; Governance	No or insignificant disruption to statutory duties.	Minor disruption to statutory duties.	Moderate disruption to statutory duties, which is noticeable to the public (customers).	Major disruption to statutory duties.	Loss of delivery of statutory duties for more than 7 days.
Partnership/Contractual; Contractual/Supplier	No or insignificant disruption to partnership or contractual work.	Minor disruption to partnership or contractual work.	Moderate disruption to partnership or contractual work, which is noticeable to the public (customers).	Major disruption to partnership or contractual work.	Loss of delivery of partnership or contractual work for more than 7 days.

Table B: Description and Definitions of Severity of the Consequence of the Threat or Opportunity, assuming the consequence occurs

Possible Receptor Category	1	2	3	4	5
"Who or What is Affected"	Insignificant	Minor	Moderate	Major	Catastrophic
Customer/Citizen; Staff; Social/People	No injuries or minor injury not requiring first aid assistance to members of the public (customers) and/or staff (i.e. cuts and abrasions, minor skin or eye irritations, etc; resulting in no lost time).	Minor injury to members of the public (customers) and/or staff (first aid treatment required; resulting in one to three days lost).	Violence or serious injury or industrial disease (medical treatment required) inflicted on members of the public (customers) and/or staff (i.e. deep wounds, fractures, scalds, burns, eye injuries, etc; resulting in more than three days lost. Reportable injury under RIDDOR.).	Extensive / multiple injuries / serious injury / industrial disease with long term medical effects inflicted on members of the public (customers) and/or staff (i.e. loss of fingers, toes, damage to eyes, serious medical effects; resulting in weeks or months off work, hospitalisation, reportable injury under RIDDOR).	Major injury or fatality of members of the public (customers) and/or staff (i.e. loss of limbs, sight, hearing, long term illness or death; resulting in permanent disablement or long term absence, reportable injury under RIDDOR).
Customer/Citizen; Staff; Social/People	No or unperceivable impact on mental health	Minor impact on mental health, e.g. leading to low-level stress which is not having an impact on work productivity or social interaction perceivable by a third party, but having an impact on person affected.	Moderate impact on mental health, e.g. leading to reduced work productivity, change in behaviour and social interactions visible to third party	Serious impact on mental health, e.g. leading to absence from work, reduced social activity and interaction	Major impact on mental health, e.g. leading to long-term absence from work and/or social long-term detrimental impact on social interactions/activity.

Table B continued: Description and definitions of Severity of the Consequence of the Threat or Opportunity, assuming the consequence occurs

Receptor Category	1	2	3	4	5
"Who or What is Affected"	Insignificant	Minor	Moderate	Major	Catastrophic
Staff	No disciplinary action required against staff responsible	Requires verbal warning (disciplinary action) against the staff responsible	Requires written warning (disciplinary action) against the staff responsible	Requires dismissal (disciplinary action) of the staff responsible.	Resignation/dismissal of senior management and/or councillors.
Assets/Property; Logistics/Infrastructure	No or insignificant damage to buildings and/or infrastructure.	Minor damage to buildings and/or infrastructure.	Moderate damage to buildings and/or infrastructure.	Major damage to buildings and/or infrastructure.	Catastrophic damage e.g. loss of buildings and/or infrastructure.
Legal; Legislation	No litigation.	Litigation with minor cost (financial and/or reputation).	Litigation with moderate cost (financial and/or reputation).	Litigation with major cost (financial and/or reputation).	Litigation with catastrophic cost (financial and/or reputation).
Reputation; Political; Professional/Managerial	No reputation damage.	Minor reputation damage (minimal coverage in local press).	Extensive front page coverage in local press and/or local TV – moderate reputation damage.	Coverage in national (broadsheet and tabloid) press and/or low national TV reporting – major reputation damage.	Extensive coverage in national press and broadsheet editorial and/or national TV item – catastrophic reputation damage.
Environmental	No or insignificant environmental damage.	Minor damage to local environment.	Moderate damage to local environment.	Major damage to local environment.	Significant local, national and/or international environmental damage.
Financial; Economic	No or insignificant financial loss.	Minor financial loss.	Moderate financial loss.	Major financial loss.	Catastrophic financial loss.

Annex C 5x5 Matrix for NI 188 Risk Assessment

The risk assessment of local authorities, LSP organisations and LSP objectives are to be completed using the 5x5 matrix in Table C to assign scores for the likelihood of occurrence of the consequence and the severity of the consequence of the threat or opportunity, should the threat or opportunity and consequence occur. It is importance to assign the scores to each axis individually. Please see Section 4d for details of method of use.

Table C: The 5x5 Matrix for NI 188 Risk Assessment, scoring of risk likelihood against severity of impact

Likelihood of Occurrence							
	Almost Certain	5	5 ↑	10 ↑	15 ↑↑	20 ↑↑	25 ↑↑
	Highly Likely	4	4 =	8 ↑	12 ↑	16 ↑↑	20 ↑↑
	Even Chance	3	3 =	6 ↑	9 ↑	12 ↑	15 ↑↑
	Likely	2	2 =	4 =	6 ↑	8 ↑	10 ↑
	Rare	1	1 =	2 =	3 =	4 =	5 ↑
			1	2	3	4	5
			Insignifi-cant	Minor	Moderate	Major	Catastro-phic
			Severity of Consequences				

Annex D Categories of Risk Level & Priority Areas for Action

The risk score assigned to each risk will allocate the risk to a category dependant on the level of risk and the level of action required. The categories corresponding to the risk scores of the 5x5 matrix in Table C in Annex C are listed in Table D.

Table D: Risk Categories & Priority Areas for Action

Description	Descriptor	Level / Scale
Very High Risk **(20-25)**	Red ↑↑↑	**Requires active management** High impact / High probability: risk requires active management to manage down and maintain exposure at an acceptable level
High Risk **(12-16)**	Amber ↑↑	**Contingency Plans** A robust contingency plan may suffice together with early warning mechanisms to detect any deviation from profile)
Medium Risk **(5-10)**	Yellow ↑	**Good Housekeeping** May require some risk mitigation to reduce likelihood if this can be done cost effectively, but good housekeeping to ensure the impact remains low should be adequate. Reassess frequently to ensure conditions remain same.
Low Risk **(1-4)**	Green =	**Review periodically** Risks are unlikely to require mitigating actions but status should be reviewed frequently to ensure conditions have not changed

Annex E Generic Impact Types for NI 188 Risk Assessment

The following list of generic impact types for use in the risk assessment template (Table E).

Table E: Generic Impact Types for NI 188 Risk Assessment

Generic Impact Types	
Increasing summer temperatures	Higher summer temperatures
	Heat waves
Increasing winter temperatures	Milder winters
	** Low temperatures / Cold spells
	** Frost / Snow / Ice
Decreasing summer precipitation	Drought
Increasing winter precipitation	Pluvial flooding (flash floods from rainfall)
	Fluvial flooding (river flooding)
	Damp / waterlogged soils
Combined climatic effects	Storms / High winds
	Lightning
	Fog / Mist / Low cloud
Indirect impacts resulting from climate change	Power disruption
	Sea level rise
	Climate enforced immigration
	Social disorder

Please Note: This list is only to be used as an indication in aid discussions with staff. Staff working within the service areas will be able to determine the appropriate timescales through consideration of the speed which with the service area can respond to changes in weather events and climate and the projected changes in climate variables in the time periods.

Annex F Climate Variables for NI 188 Risk Assessment

Data is available from the UKCP09 scenarios for the following list of climate variables. Data has been collated for use in the risk assessment template for the variables highlighted in the Table F.

Table F: Climatic Variables for NI 188 Risk Assessment

UKCP09 Scenario Climatic Variables	In Template
Mean air temperature	Y (Winter and Summer)
Mean daily maximum temperature [Max air temperature]	Y (Summer)
Mean daily minimum temperature [Min air temperature]	Y (Summer)
Temperature of the coolest day	
Temperature of the warmest day	
Temperature of the coldest night	
Temperature of the warmest night	
Mean Precipitation (%)	Y (Annual,Winter,Summer)
Precipitation [Precipitation rate]	
Precipitation on the wettest day	
Mean sea level pressure	
Total cloud cover	
Relative humidity	
Specific humidity	
Net surface longwave flux	
Net surface shortwave flux	
Total downward surface shortwave flux	
Standard Weather Generator Variables (mandatory)	
Long-term trend in skew surge (1951-2099)	
Absolute Sea Level Rise (m)	
Relative Sea Level Rise (m)	

Annex G Receptor Categories for NI 188 Risk Assessment

Table G includes the definitions of the receptor categories “who or what is affected” (Template Column F).

Table G: Receptor categories for the NI 188 Risk Assessment template

Risk Receptor	Description
• Assets/Property	Risks associated with buildings, vehicles, plant, equipment (e.g. those related to fire, security, accident prevention and health and safety, accessibility etc).
• Contractual/Supplier	Risks associated with the ability of contractors/suppliers to deliver services or products on time to the agreed cost.
• Customer/Citizen	Those associated with the organisations ability to meet the current and changing needs and expectations of customers and citizens. Change in demand of services and impacts on the process of service delivery.
• Economic	Those associated with the ability of the organisation to meet its financial commitments. These may be external (e.g. interest rates, exchange rates, inflation) or internal (e.g. budgetary pressures, adequacy of insurance cover, consequences of proposed investment decision).
• Environmental	Those relating to the environment consequences of progressing the organisation’s strategic objectives (e.g. recycling, landfill requirements, emissions, etc) or the impacts of ongoing operations (e.g. pollution, noise, energy efficiency).
• Financial	Risks associated with the effective management and control of the finances of the organisation and instances of fraud.
• Governance	Those related to the structures and processes for decision-making and accountability, controls and behaviour. The process by which organisations manage their business, determine strategy and objectives and implement them.
• Legal	Those related to possible breaches of legislation, or compliance with laws and regulations designed to reduce hazards (e.g. Health and Safety at work).
• Legislative	Those associated with current or potential changes in national or European Law (e.g. Human Rights Act, Freedom of Information Act, Children Act etc).
• Logistics/Infrastructure	Vulnerability of supply chain, utilities and transport infrastructure. Vulnerability of any type of infrastructure e.g. buildings, roads etc

Table G continued: Receptor categories for the NI 188 Risk Assessment

Risk Receptor	Description
• Partnership/Contractual	Those associated with the organisation's ability to attract partners and work effectively with them. May be influenced by the organisation's reputation and the public perception of the organisation's efficiency and effectiveness.
• Political	Those associated with the organisation's ability to deliver either central government policy or meet the administrations manifesto commitments.
• Professional/Managerial	Risks associated with the particular nature of each profession and the people who deliver those services (e.g. Human Rights and the emergency services, child protection and family welfare.
• Reputation	Failure to manage reputation issues may result in an adverse impact on the Council's overall reputation; and/or low satisfaction.
• Social/People	Those relating to the effects of changes in socio-demographic trends on the organisation's ability to deliver its objectives (e.g. ability to recruit, retain and motivate staff with the required skills in required numbers).
• Staff	Those associated with staff unable to work due to childcare responsibilities in the event of school closures, increased workload, difficult working conditions due to heat/cold etc
• Technological	Those associated with the capacity of the organisation to deal with the pace/scale of technological change, or its ability to use technology to address changing demands. Also those relating to the organisation's reliance on operational equipment (e.g. IT systems or equipment and machinery).

Annex H Interview Question Guidance

Introduction

Consider that climate change is predicted to increase the likelihood of extreme weather events (more detail can be given from LCLIP/ UKCIP data for the regions) and to give us a more Mediterranean climate in general.

- Has your service already considered how these changes in climate and extreme events will affect you in the future? (this can be a general question that leads to filling in the risk assessment table)

- Do your planning strategies differ for the short, medium and long term? Do you consider all three timescales? (this can help determine whether you need to focus on 2020's and 2050's and 2080's in the risk assessment table)

Identifying Risks

The general impacts of climate change identified for the region are that summers will be hotter and drier, winters will be milder and wetter and that the chance of storminess will increase. I would now like to go through each change and its resulting impact (one-by-one) with you to identify potential consequences that may affect your service.

- What kind of consequences do you think each impact could have on your service? (perhaps have a few in the back of your mind to help prompt them if they get stuck?)

- Do you believe that these may change over time?

- Who/ what areas do you believe will be impacted by these consequences in your service? (can show them the list of receptor categories)

- Do you have any control measures/ changes in policies that you put into place to deal with these events? What are the costs of these measures?

- How would you rate the severity of the potential consequence, looking at the description and definition of impact table? Would this change with time? (looking at the 2020's, 2050's, 2080's)

- How would you rate the likelihood of the consequence happening, looking at the description and definition of probability table? Would this change with time? (looking at the 2020's, 2050's, 2080's)

- Are there any risks you believe we have left out? (then go through the same process for these - if there are any extras)

Now on to potential adaptation measures…

- Do you have any ideas on how you could reduce your vulnerability?
- What do you believe these costs would be/what kind of resources would you require?
- What kind of action would be required by whom, or would you need to coordinate with other local authority areas?
- When would you need to have done this by?

Thank you & Feedback

Thank you for all your help. Mention that you will contact them again for potential feedback and to let them know about the outcomes of the study.

Annex I Information Sheet 1: UKCP09 Scenarios

The UKCP09 projections include the results of three sets projected greenhouse gas (GHG) emission scenarios; Low, Medium and High developed by the IPCC (Intergovernmental Panel on Climate Change) (Box 1) :

- Low emissions IPCC SRES B1
- Medium emissions IPCC SRES A1B
- High emissions IPCC SRES A1F1

Box 1: From IPCC 2000 Special Report on Emissions Scenarios (SRES)

The SRES scenarios cover a wide range of future emissions. To facilitate the process of identifying alternative future developments, the IPCC writing team decided to describe their scenarios coherently by narrative storylines. The storylines describe developments in many different economic, technical, environmental and social dimensions. The titles of the storylines have been kept simple: A1, A2, B1 and B2.

- The A1 storyline and scenario family describes a future world of very rapid economic growth, global population that peaks in mid-century and declines thereafter, and the rapid introduction of new and more efficient technologies. Major underlying themes are convergence among regions, capacity building, and increased cultural and social interactions, with a substantial reduction in regional differences in per capita income. The A1 scenario family develops into three groups that describe alternative directions of technological change in the energy system. The three A1 groups are distinguished by their technological emphasis: fossil intensive (A1FI), non-fossil energy sources (A1T), or a balance across all sources (A1B).
- The A2 storyline and scenario family describes a very heterogeneous world. The underlying theme is self-reliance and preservation of local identities. Fertility patterns across regions converge very slowly, which results in continuously increasing global population. Economic development is primarily regionally oriented and per capita economic growth and technological changes are more fragmented and slower than in other storylines.

- The B1 storyline and scenario family describes a convergent world with the same global population that peaks in mid-century and declines thereafter, as in the A1 storyline, but with rapid changes in economic structures toward a service and information economy, with reductions in material intensity, and the introduction of clean and resource-efficient technologies. The emphasis is on global solutions to economic, social, and environmental sustainability, including improved equity, but without additional climate initiatives

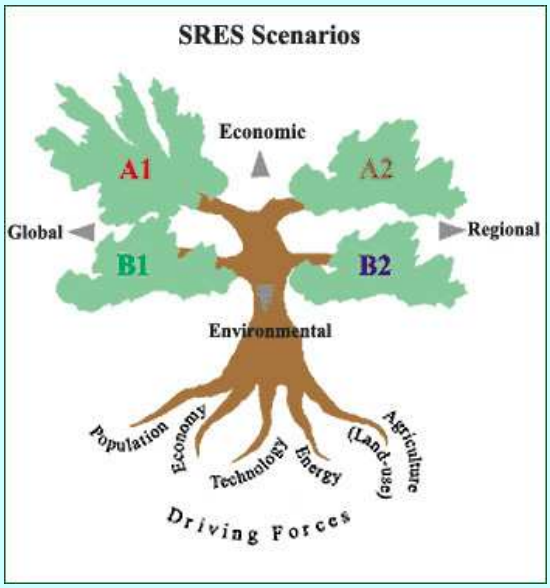
- The B2 storyline and scenario family describes a world in which the emphasis is on local solutions to economic, social, and environmental sustainability. It is a world with continuously increasing global population at a rate lower than A2, intermediate levels of economic development, and less rapid and more diverse technological change than in the B1 and A1 storylines. While the scenario is also oriented toward environmental protection and social equity, it focuses on local and regional levels.

For further information on UKCP09 and IPCC projections see:

The Climate Change Projections Report (UKCIP, 2009)
IPCC Fourth Assessment Report (AR4) (2007)
IPCC Special Report on Emissions Scenarios (SRES) (2000)

Box 1: continued.

Figure Box 1: Schematic illustration of SRES scenarios. The four scenario "families" are illustrated, very simplistically, as branches of a two-dimensional tree. In reality, the four scenario families share a space of a much higher dimensionality given the numerous assumptions needed to define any given scenario in a particular modelling approach. The schematic diagram illustrates that the scenarios build on the main driving forces of GHG emissions. Each scenario family is based on a common specification of some of the main driving forces.



For the NI 188 risk assessment, UKCIP have provided the ranges of projected changes in climatic variables for each timescale and the observed average between 1961 and 1990. The projected changes in climatic variables mainly differ from 2050 onwards, when the three difference groups of GHG emissions scenarios produced difference ranges of change in the climatic variables. To incorporate the probabilistic nature of the UKCP09 scenarios and the differences between the three GHG emission scenarios, Laurie Newton (from UKCIP) has provided ranges of climatic variables for the risk assessment.

For the NI 188 risk assessment, future projections from UKCP09 for six climate variables were selected:

- Mean summer temperature (℃)
- Mean summer daily maximum temperature (℃)
- Mean summer daily minimum temperature (℃)
- Mean winter temperature (℃)
- Summer mean precipitation (%)
- Winter mean precipitation (%)

Climate variables were considered in three time periods; 2020s, 2030s and 2080s.

For each climatic variable, the three emission scenarios produced overlapping ranges of projected changes for a single timescale (Figure I1). For each emissions scenario, the projected value of change in the variable has been calculated for:

- 10^{th} percentile (P_{10}): the value 10% of the projected values are below
- 50^{th} percentile (P_{50}): the value 50% of the projected values are below
- 90^{th} percentile (P_{90}): the value 90% of the projected values are below

N.B The central estimate of the probability distribution of the variable, P_{50}, does not indicate the average for the climatic variable.

To incorporate the probabilistic nature of the UKCP09 projections and the differences between the three emission scenarios (B1, A1B and A1F), the 'middle central estimate' from all three emissions scenarios, was taken as the basis for the key messages projected for the East Midlands. Additionally, a 'wider range' was calculated which corresponded to the lowest 10th percentile and the highest 90th percentile from all three emissions scenarios for each climate variable (Figure I1). Use of this range has been selected under advice from UKCIP.

The use of this range has been selected under advice from UKCIP. The value ranges for the climate variables have been calculated by UKCIP and have been provided in the risk assessment template. For further information on the UKCP09 scenarios and probabilistic projections, please visit the Defra website at:

http://ukclimateprojections.defra.gov.uk/

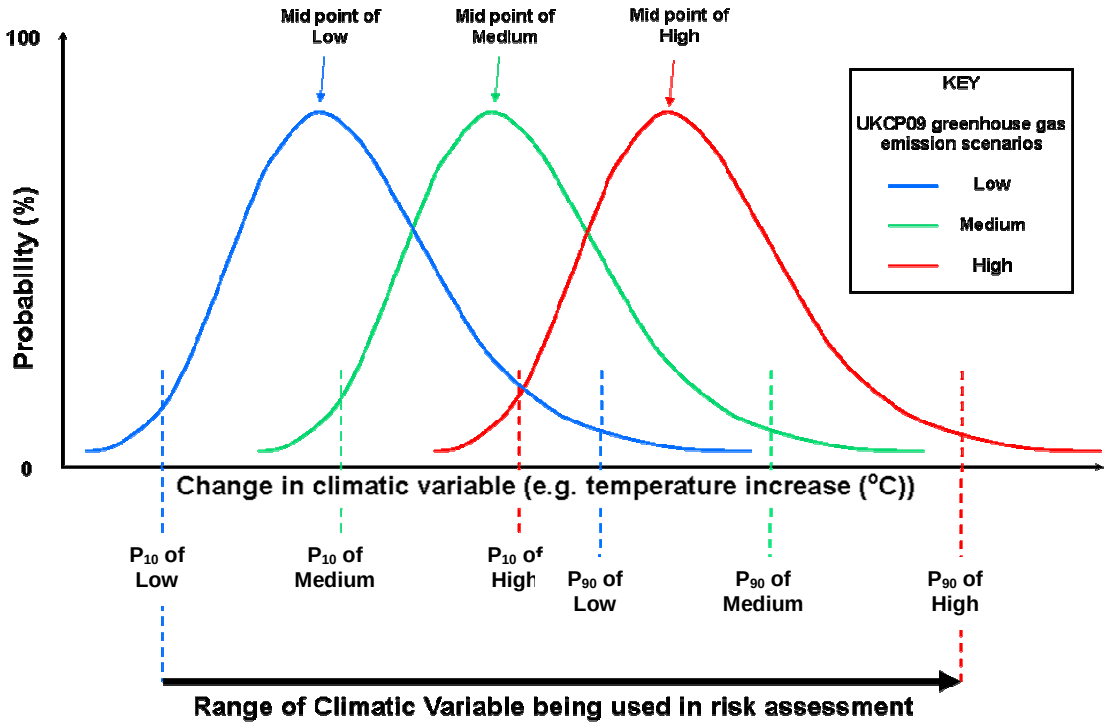


Figure I1: Schematic of overlapping ranges of probability of occurrences of changes in climatic variable in three greenhouse gas emissions scenarios (Low, Medium and High), where P_{10} = 10th percentile, P_{50} = 50th percentile (Mid-point), P_{90} = 90th percentile (adapted from Figure 4.1, UKCIP 2009b).

For climate variables within the 2020s, the ranges of projected values overlap greatly (Figure I2a). For climate variables within the 2080s, the ranges of projected values overlap to a lesser extent (Figure I2b). This effect is in part due to the increasing uncertainty when projecting further into the future, the greater uncertainty within the models and the extent to which changes in the future are likely to be greater changes than in the next few decades.

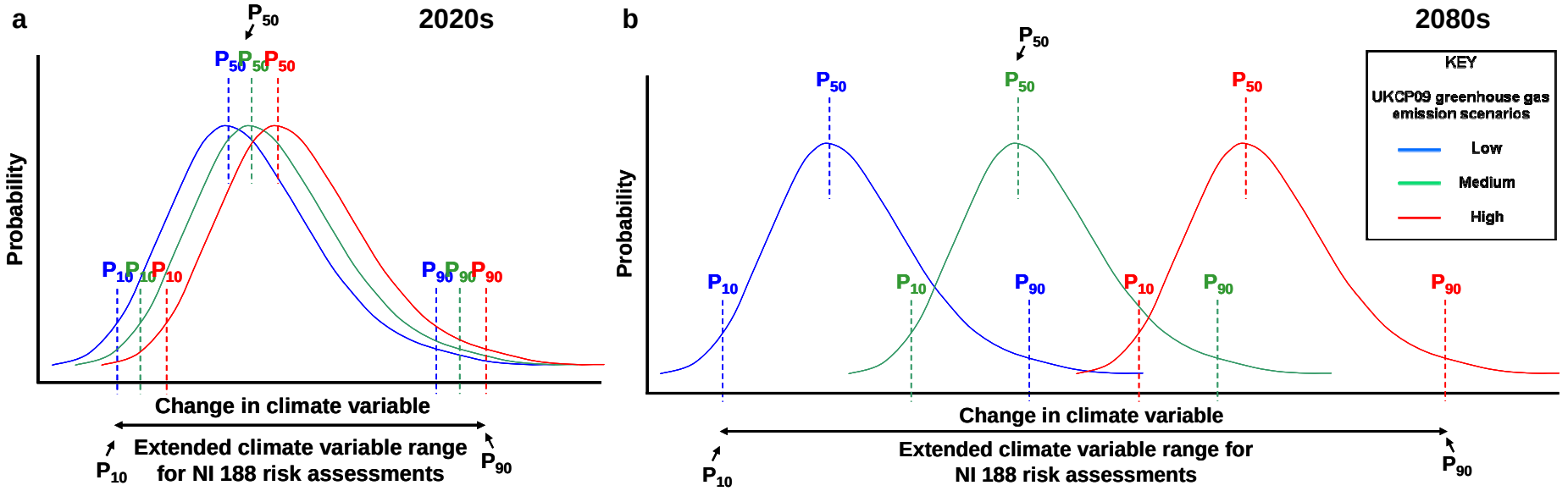


Figure I2: Schematic of overlapping ranges of probability of occurrences of changes in climatic variable in three greenhouse gas emissions scenarios (Low, Medium and High) for **a)** 2020s and **b)** 2080s, where P_{10} = 10th percentile, P_{50} = 50th percentile (Mid-point), P_{90} = 90th percentile (adapted from Figure 4.1, UKCIP 2009b).

Please note: Depending on the climate variable and the range of projected values for the scenarios, the lowest P10 value may not necessarily come from the Low emissions scenario, and likewise the highest P90 value may not necessarily come from the High emissions scenario.

In addition, depending on the climatic variable, the climate model scenarios have projected increases and/or decreases across the time periods. Therefore care needs to be taken when interpreting the key findings information, particularly precipitation variables. The schematic diagrams in Figure I3 indicate how negative climate variables are found within the P_{10} – P_{90} ranges.

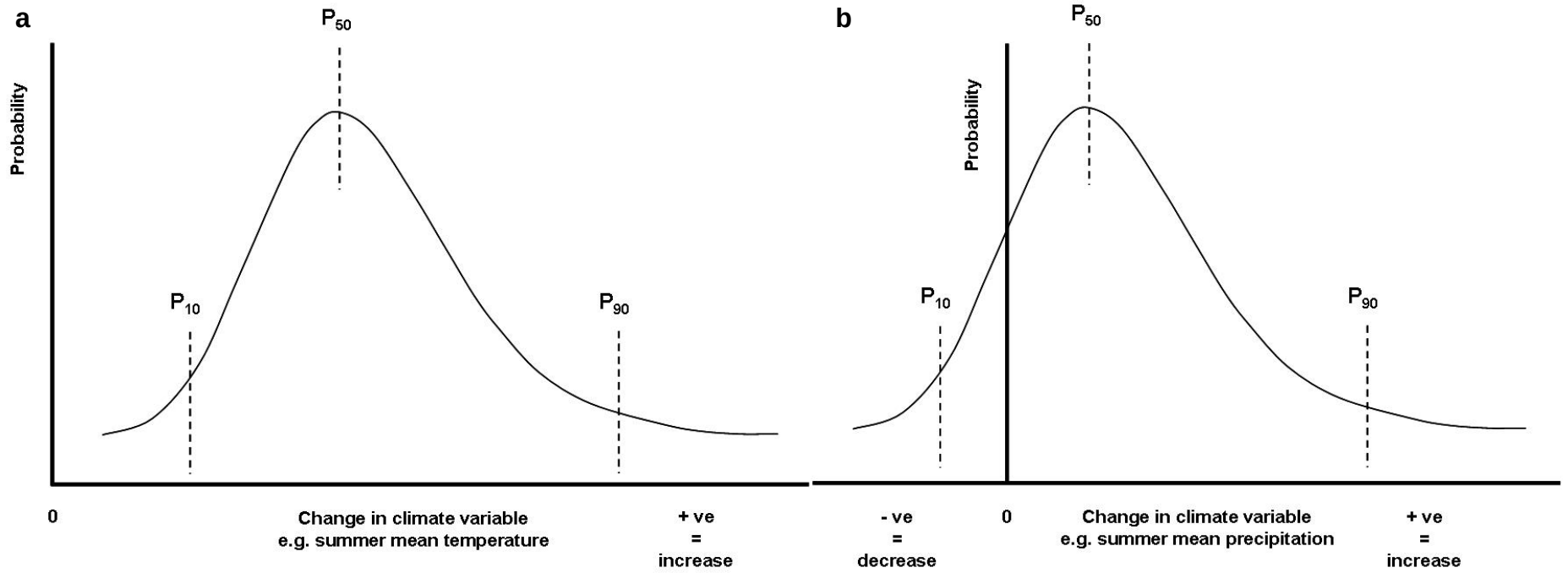


Figure 3: Schematic of a climatic variable projected by climate models **a)** to increase over the time period, and **b)** to increase or decrease over the time period depending on the model, where P_{10} = 10th percentile, P_{50} = 50th percentile (Mid-point), P_{90} = 90th percentile (adapted from Figure 4.1, UKCIP 2009b).

Annex J Key Findings of the UKCP09 Scenarios for the East Midlands: Projected Figures (Percentiles)

Table J1: Temperature date for future all scenarios provided by UKCP09 **N.B** shaded boxes indicate figures used in the key message outlined in Annex K

	Mean temperature, summer ºC					Mean daily maximum temperature, summer ºC					Mean daily minimum temperature, summer ºC					Mean temperature, winter ºC				
Probability level (%)	**10**	**50**	**90**	**Wider range**		**10**	**50**	**90**	**Wider range**		**10**	**50**	**90**	**Wider range**		**10**	**50**	**90**	**Wider range**	
2020s																				
Low emissions	0.6	1.5	2.5			0.6	2	3.5			0.7	1.6	2.7			0.5	1.3	2.1		
Medium emissions	0.5	1.4	2.5	0.4	2.5	0.5	1.9	3.4	0.5	3.5	0.6	1.5	2.6	0.6	2.7	0.6	1.3	2.1	0.5	2.2
High emissions	0.4	1.4	2.4			0.5	1.8	3.4			0.6	1.5	2.7			0.5	1.3	2.2		
2050s																				
Low emissions	1.1	2.3	3.9			1.1	3.1	5.5			1.1	2.4	4.2			0.9	1.9	3.1		
Medium emissions	1.2	2.5	4.2	1.1	4.7	1.3	3.3	5.9	1.1	6.6	1.2	2.7	4.6	1.1	5.5	1.1	2.2	3.4	0.9	3.8
High emissions	1.3	2.8	4.7			1.6	3.8	6.6			1.5	3.1	5.5			1.4	2.5	3.8		
2080s																				
Low emissions	1.2	2.7	4.6			1.2	3.6	6.6			1.3	2.9	5.2			1.4	2.6	3.9		
Medium emissions	1.8	3.5	5.8	1.2	7.3	2	4.7	8.3	1.2	10.3	1.8	3.8	6.5	1.3	8.2	1.6	3	4.6	1.4	5.5
High emissions	2.3	4.4	7.3			2.7	6	10.3			2.5	4.9	8.2			2	3.6	5.5		

Table J2: Precipitation date for future all scenarios provided by UKCP09 **N.B** shaded boxes indicate figures used in the key message outlined in Annex K

	Annual mean precipitation %					Summer mean precipitation %					Winter mean precipitation %				
Probability level (%)	**10**	**50**	**90**	**Wider range**		**10**	**50**	**90**	**Wider range**		**10**	**50**	**90**	**Wider range**	
2020s															
Low emissions	-3	1	6			-20	-5	11			-2	6	16		
Medium emissions	-4	0	6	-4	6	-22	-6	12	-22	15	-2	5	16	-2	16
High emissions	-3	0	6			-19	-3	15			-1	6	16		
2050s															
Low emissions	-4	0	5			-32	-11	13			1	11	25		
Medium emissions	-4	0	6	-5	6	-35	-15	6	-37	13	2	14	29	1	33
High emissions	-5	0	6			-37	-16	7			3	15	33		
2080s															
Low emissions	-2	2	7			-33	-12	11			3	15	32		
Medium emissions	-4	0	6	-6	9	-42	-19	6	-50	11	3	18	41	3	53
High emissions	-6	1	9			-50	-24	4			6	25	53		

Annex K Key Findings of UKCP09 Scenarios for the East Midlands: Descriptions & Maps (in IPCC terms)

K1: Key Findings As maps

N.B. Key messages taken from the UKCP09 projections were based on the middle central estimate from all 3 emissions scenarios, while the wider range corresponds to the lowest 10th percentile and the highest 90th percentile from all three emissions scenarios (Table J1 & J2).

Increasing summer temperatures

Increasing summer mean temperatures

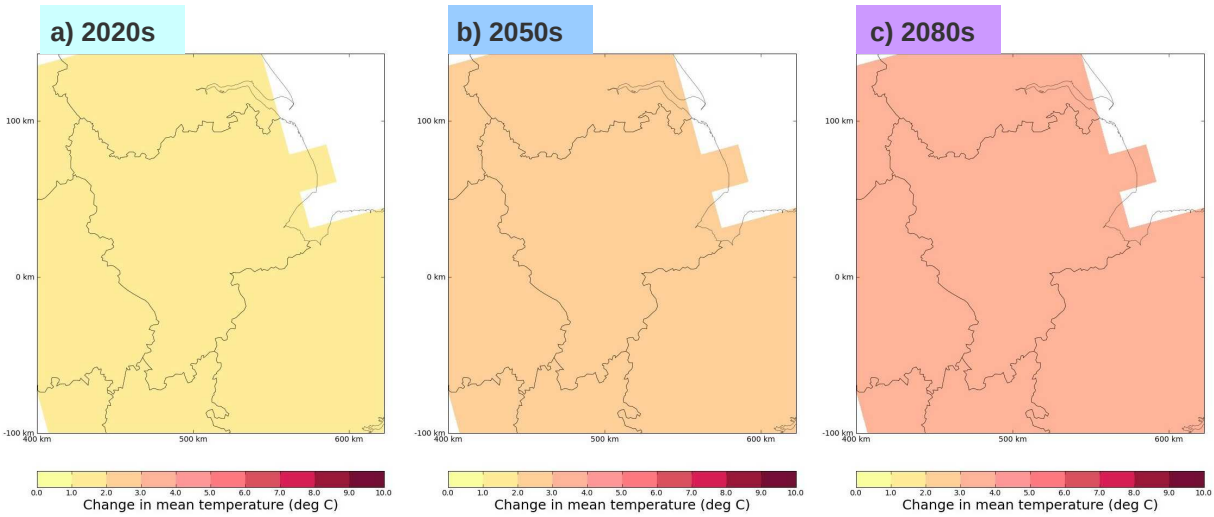


Fig 1: The middle central estimate of projected i*ncrease* in **summer mean temperature** is: **a)** 1.4ºC by 2020s **b)** 2.5ºC by 2050s **c)** 3.5ºC by 2080s, with a wider range of: 0.4 to 2.5ºC by 2020s / 1.1 to 4.7ºC by 2050s by / 1.2 to 7.3ºC by 2080s.

Increasing summer mean daily maximum temperature

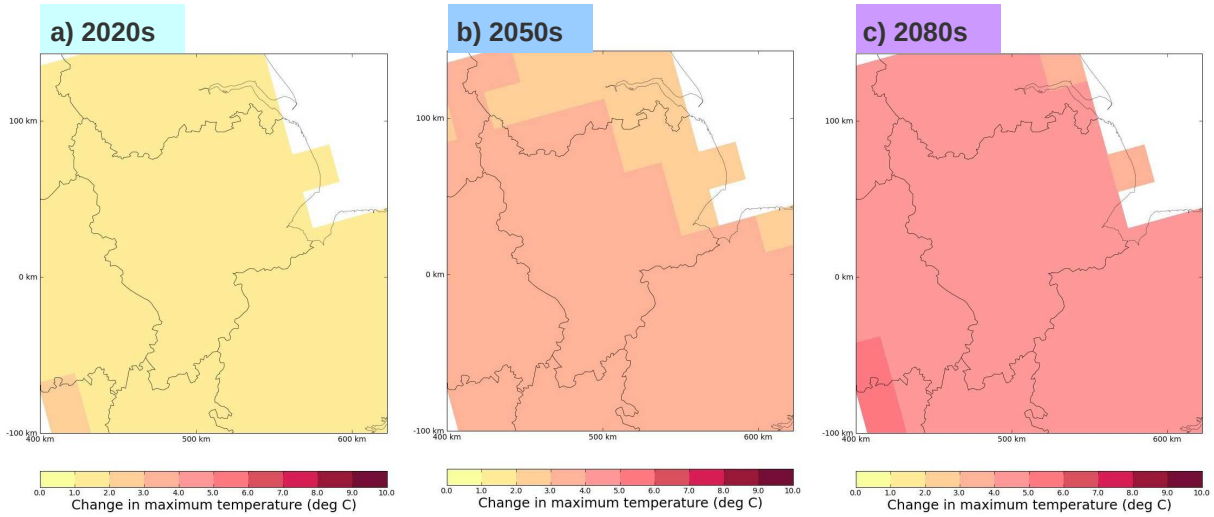


Fig 2: The middle central estimate of projected *increase* in **summer mean daily maximum temperature** is: **a)** 1.9ºC by 2020s **b)** 3.3ºC by 2050s **c)** 4.7ºC by 2080s, with a wider range of: 0.5 to 3.5ºC by 2020s / 1.1 to 6.6ºC by 2050s by / 1.2 to 10.3ºC by 2080s.

Increasing summer mean daily minimum temperature

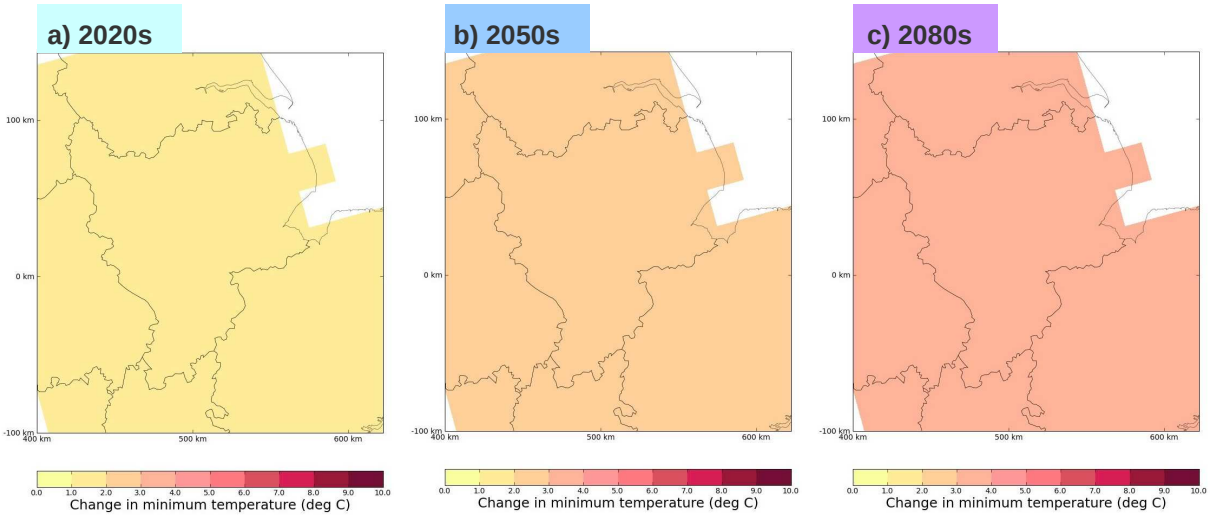


Fig 3: The middle central estimate of projected *increase* in **summer mean daily minimum temperature** is: **a)** 1.5ºC by 2020s **b)** 2.7ºC by 2050s **c)** 3.8ºC by 2080s, with a wider range of: 0.6 to 2.7ºC by 2020s / 1.1 to 5.5ºC by 2050s by / 1.3 to 8.2ºC by 2080s.

Increasing winter temperatures

Increasing winter mean temperatures

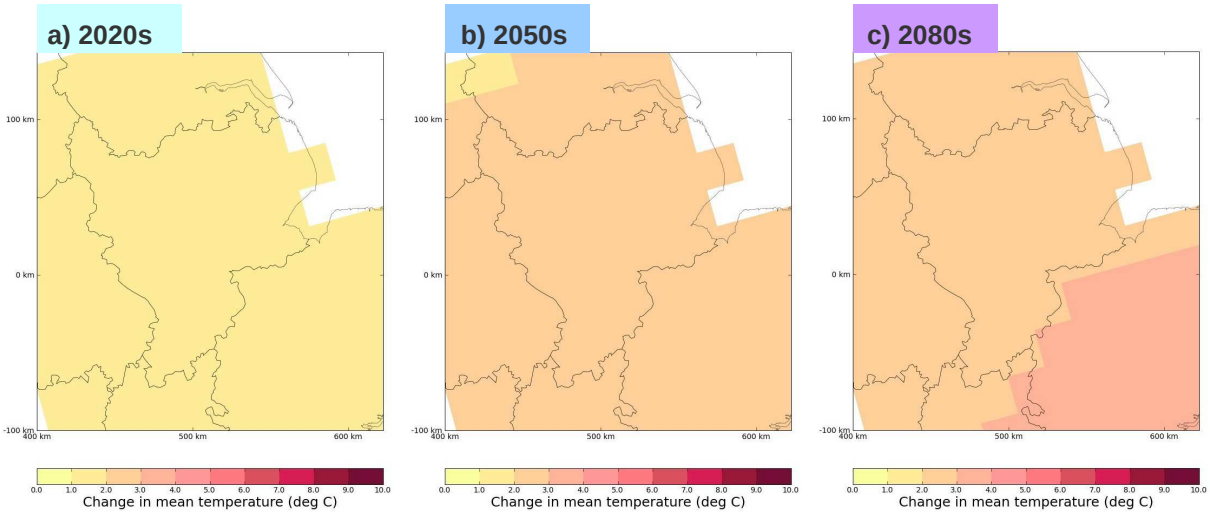


Fig 4: The middle central estimate of projected *increase* in **winter mean temperature** is: **a)** 1.3℃ by 2020s **b)** 2.2ºC by 2050s **c)** 3.0ºC by 2080s, with a wider range of: 0.5 to 2.2ºC by 2020s / 0.9 to 3.8ºC by 2050s by / 1.4 to 5.5ºC by 2080s.

Decreasing summer precipitation

Decreasing summer mean precipitation

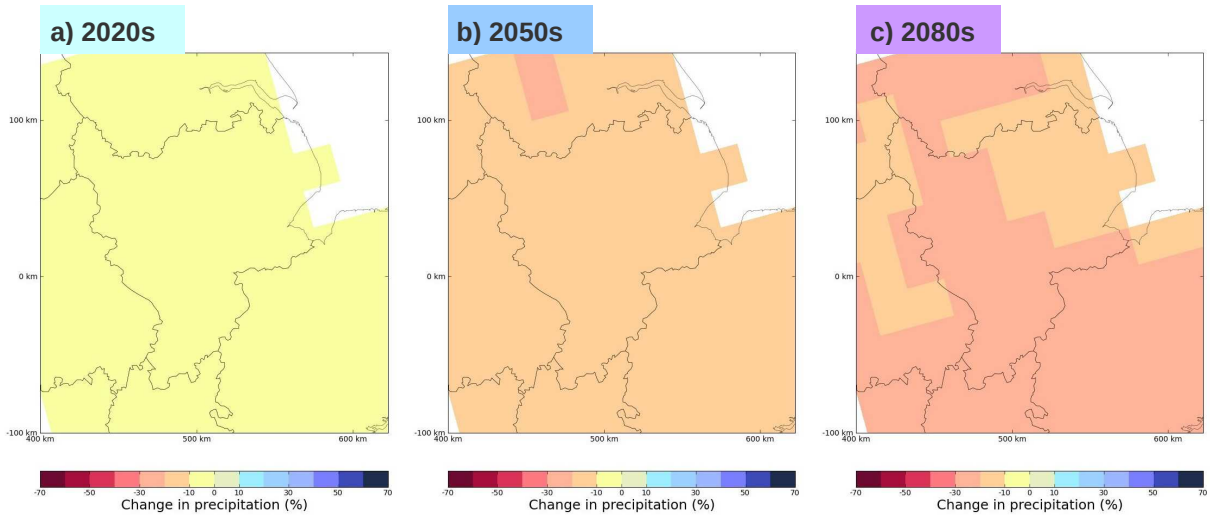


Fig 5: The middle central estimate of projected d*ecrease* in **summer mean precipitation** is: **a)** -5% by 2020s **b)** -15% by 2050s **c)** -19% by 2080s, with a wider range of: -22 to 15% by 2020s / -37 to 13% by 2050s / -50 to 11% by 2080s.

Increasing winter precipitation

Increasing winter mean precipitation

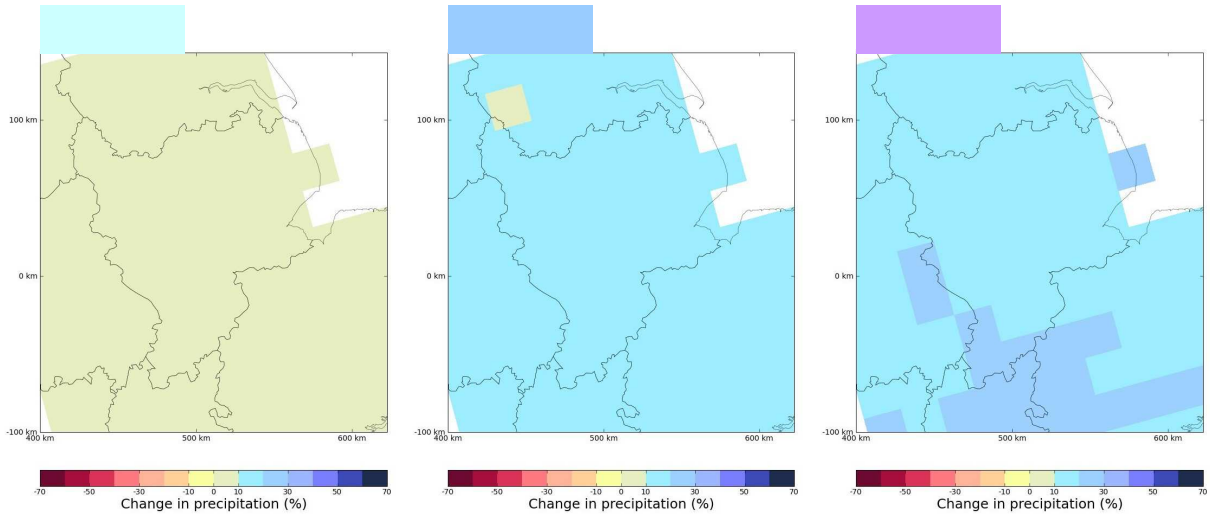


Fig 6: The middle central estimate of projected i*ncrease* in **winter mean precipitation** is: **a)** 6% by 2020s **b)** 14% by 2050s **c)** 18% by 2080s, with a wider range of: -2 to 16% by 2020s / 1 to 33% by 2050s / 3 to 53% by 2080s.

2020s summer mean temperature

Under **low** emissions, the central estimate of increase in summer mean temperature is 1.5ºC; it is very unlikely to be less than 0.6ºC and is very unlikely to be more than 2.5ºC. A wider range of uncertainty is from 0.4ºC to 2.5ºC.

Under **medium** emissions, the central estimate of increase in summer mean temperature is 1.4ºC; it is very unlikely to be less than 0.5ºC and is very unlikely to be more than 2.5ºC. A wider range of uncertainty is from 0.4ºC to 2.5ºC

Under **high** emissions, the central estimate of increase in summer mean temperature is 1.4ºC; it is very unlikely to be less than 0.4ºC and is very unlikely to be more than 2.4ºC. A wider range of uncertainty is from 0.4ºC to 2.4ºC.

2050s summer mean temperature

Under **low** emissions, the central estimate of increase in summer mean temperature is 2.3ºC; it is very unlikely to be less than 1.1ºC and is very unlikely to be more than 3.9ºC. A wider range of uncertainty is from 1.1ºC to 4.7ºC.

Under **medium** emissions, the central estimate of increase in summer mean temperature is 2.5ºC; it is very unlikely to be less than 1.2ºC and is very unlikely to be more than 4.2ºC. A wider range of uncertainty is from 1.1ºC to 4.7ºC.

Under **high** emissions, the central estimate of increase in summer mean temperature is 2.8ºC; it is very unlikely to be less than 1.3ºC and is very unlikely to be more than 4.7ºC. A wider range of uncertainty is from 1.1ºC to 4.7ºC.

2080s summer mean temperature

Under **low** emissions, the central estimate of increase in summer mean temperature is 2.7ºC; it is very unlikely to be less than 1.2ºC and is very unlikely to be more than 4.6ºC. A wider range of uncertainty is from 1.2ºC to 7.3ºC.

Under **medium** emissions, the central estimate of increase in summer mean temperature is 3.5ºC; it is very unlikely to be less than 1.8ºC and is very unlikely to be more than 5.8ºC. A wider range of uncertainty is from 1.2ºC to 7.3ºC.

Under **high** emissions, the central estimate of increase in summer mean temperature is 4.4ºC; it is very unlikely to be less than 2.3ºC and is very unlikely to be more than 7.3ºC. A wider range of uncertainty is from 1.2ºC to 7.3ºC.

2020s summer mean daily maximum temperature

Under **low** emissions, the central estimate of increase in summer mean daily maximum temperature is 2ºC; it is very unlikely to be less than 0.6ºC and is very unlikely to be more than 3.5ºC. A wider range of uncertainty is from 0.5ºC to 3.5ºC.

Under **medium** emissions, the central estimate of increase in summer mean daily maximum temperature is 1.9ºC; it is very unlikely to be less than 0.5ºC and is very unlikely to be more than 3.4ºC. A wider range of uncertainty is from 0.5ºC to 3.5ºC.

Under **high** emissions, the central estimate of increase in summer mean daily maximum temperature is 1.8ºC; it is very unlikely to be less than 0.5ºC and is very unlikely to be more than 3.4ºC. A wider range of uncertainty is from 0.5ºC to 3.5ºC.

2050s summer mean daily maximum temperature

Under **low** emissions, the central estimate of increase in summer mean daily maximum temperature is 3.1ºC; it is very unlikely to be less than 1.1ºC and is very unlikely to be more than 5.5ºC. A wider range of uncertainty is from 1.1ºC to 6.6ºC.

Under **medium** emissions, the central estimate of increase in summer mean daily maximum temperature is 3.3ºC; it is very unlikely to be less than 1.3ºC and is very unlikely to be more than 5.9ºC. A wider range of uncertainty is from 1.1ºC to 6.6ºC.

Under **high** emissions, the central estimate of increase in summer mean daily maximum temperature is 3.8ºC; it is very unlikely to be less than 1.6ºC and is very unlikely to be more than 6.6ºC. A wider range of uncertainty is from 1.1ºC to 6.6ºC.

2080s summer mean daily maximum temperature

Under **low** emissions, the central estimate of increase in summer mean daily maximum temperature is 3.6ºC; it is very unlikely to be less than 1.2ºC and is very unlikely to be more than 6.6ºC. A wider range of uncertainty is from 1.2ºC to 10.3ºC.

Under **medium** emissions, the central estimate of increase in summer mean daily maximum temperature is 4.7ºC; it is very unlikely to be less than 2ºC and is very unlikely to be more than 8.3ºC. A wider range of uncertainty is from 1.2ºC to 10.3ºC.

Under **high** emissions, the central estimate of increase in summer mean daily maximum temperature is 6ºC; it is very unlikely to be less than 2.7ºC and is very unlikely to be more than 10.3ºC. A wider range of uncertainty is from 1.2ºC to 10.3ºC.

2020s summer mean daily minimum temperature

Under **low** emissions, the central estimate of increase in summer mean daily minimum temperature is 1.6ºC; it is very unlikely to be less than 0.7ºC and is very unlikely to be more than 2.7ºC. A wider range of uncertainty is from 0.6ºC to 2.7ºC.

Under **medium** emissions, the central estimate of increase in summer mean daily minimum temperature is 1.5ºC; it is very unlikely to be less than 0.6ºC and is very unlikely to be more than 2.6ºC. A wider range of uncertainty is from 0.6ºC to 2.7ºC.

Under **high** emissions, the central estimate of increase in summer mean daily minimum temperature is 1.5ºC; it is very unlikely to be less than 0.6ºC and is very unlikely to be more than 2.7ºC. A wider range of uncertainty is from 0.6ºC to 2.7ºC.

2050s summer mean daily minimum temperature

Under **low** emissions, the central estimate of increase in summer mean daily minimum temperature is 2.4ºC; it is very unlikely to be less than 1.1ºC and is very unlikely to be more than 4.2ºC. A wider range of uncertainty is from 1.1ºC to 5.5ºC.

Under **medium** emissions, the central estimate of increase in summer mean daily minimum temperature is 2.7ºC; it is very unlikely to be less than 1.2ºC and is very unlikely to be more than 4.6ºC. A wider range of uncertainty is from 1.1ºC to 5.5ºC.

Under **high** emissions, the central estimate of increase in summer mean daily minimum temperature is 3.1ºC; it is very unlikely to be less than 1.5ºC and is very unlikely to be more than 5.5ºC. A wider range of uncertainty is from 1.1ºC to 5.5ºC.

2080s summer mean daily minimum temperature

Under **low** emissions, the central estimate of increase in summer mean daily minimum temperature is 2.9ºC; it is very unlikely to be less than 1.3ºC and is very unlikely to be more than 5.2ºC. A wider range of uncertainty is from 1.3ºC to 8.2ºC.

Under **medium** emissions, the central estimate of increase in summer mean daily minimum temperature is 3.8ºC; it is very unlikely to be less than 1.8ºC and is very unlikely to be more than 6.5ºC. A wider range of uncertainty is from 1.3ºC to 8.2ºC

Under **high** emissions, the central estimate of increase in summer mean daily minimum temperature is 4.9ºC; it is very unlikely to be less than 2.5ºC and is very unlikely to be more than 8.2ºC. A wider range of uncertainty is from 1.3ºC to 8.2ºC.

Winter temperature

2020s winter mean temperature

Under **low** emissions, the central estimate of increase in winter mean temperature is 1.3ºC; it is very unlikely to be less than 0.5ºC and is very unlikely to be more than 2.1ºC. A wider range of uncertainty is from 0.5ºC to 2.2ºC.

Under **medium** emissions, the central estimate of increase in winter mean temperature is 1.3ºC; it is very unlikely to be less than 0.6ºC and is very unlikely to be more than 2.1ºC. A wider range of uncertainty is from 0.5ºC to 2.2ºC.

Under **high** emissions, the central estimate of increase in winter mean temperature is 1.3ºC; it is very unlikely to be less than 0.5ºC and is very unlikely to be more than 2.2ºC. A wider range of uncertainty is from 0.5ºC to 2.2ºC.

2050s winter mean temperature

Under **low** emissions, the central estimate of increase in winter mean temperature is 1.9ºC; it is very unlikely to be less than 0.9ºC and is very unlikely to be more than 3.1ºC. A wider range of uncertainty is from 0.9ºC to 3.8ºC.

Under **medium** emissions, the central estimate of increase in winter mean temperature is 2.2ºC; it is very unlikely to be less than 1.1ºC and is very unlikely to be more than 3.4ºC. A wider range of uncertainty is from 0.9ºC to 3.8ºC.

Under **high** emissions, the central estimate of increase in winter mean temperature is 2.5ºC; it is very unlikely to be less than 1.4ºC and is very unlikely to be more than 3.8ºC. A wider range of uncertainty is from 0.9ºC to 3.8ºC.

2080s winter mean temperature

Under **low** emissions, the central estimate of increase in winter mean temperature is 2.6ºC; it is very unlikely to be less than 1.4ºC and is very unlikely to be more than 3.9ºC. A wider range of uncertainty is from 1.4ºC to 5.5ºC.

Under **medium** emissions, the central estimate of increase in winter mean temperature is 3ºC; it is very unlikely to be less than 1.6ºC and is very unlikely to be more than 4.6ºC. A wider range of uncertainty is from 1.4ºC to 5.5ºC.

Under **high** emissions, the central estimate of increase in winter mean temperature is 3.6ºC; it is very unlikely to be less than 2ºC and is very unlikely to be more than 5.5ºC. A wider range of uncertainty is from 1.4ºC to 5.5ºC.

Summer precipitation

2020s summer mean precipitation

Under **low** emissions, the central estimate of change in summer mean precipitation is -5%; it is very unlikely to be less than -20% and is very unlikely to be more than 11%. A wider range of uncertainty is from -22% to 15%.

Under **medium** emissions, the central estimate of change in summer mean precipitation is -6%; it is very unlikely to be less than -22% and is very unlikely to be more than 12%. A wider range of uncertainty is from -22% to 15%.

Under **high** emissions, the central estimate of change in summer mean precipitation is -3%; it is very unlikely to be less than -19% and is very unlikely to be more than 15%. A wider range of uncertainty is from -22% to 15%.

2050s summer mean precipitation

Under **low** emissions, the central estimate of change in summer mean precipitation is -11%; it is very unlikely to be less than -32% and is very unlikely to be more than 13%. A wider range of uncertainty is from -37% to 13%.

Under **medium** emissions, the central estimate of change in summer mean precipitation is -15%; it is very unlikely to be less than -35% and is very unlikely to be more than 6%. A wider range of uncertainty is from -37% to 13%.

Under **high** emissions, the central estimate of change in summer mean precipitation is -16%; it is very unlikely to be less than -37% and is very unlikely to be more than 7%. A wider range of uncertainty is from -37% to 13%.

2080s summer mean precipitation

Under **low** emissions, the central estimate of change in summer mean precipitation is -12%; it is very unlikely to be less than -33% and is very unlikely to be more than 11%. A wider range of uncertainty is from -50% to 11%.

Under **medium** emissions, the central estimate of change in summer mean precipitation is -19%; it is very unlikely to be less than -42% and is very unlikely to be more than 6%. A wider range of uncertainty is from -50% to 11%.

Under **high** emissions, the central estimate of change in summer mean precipitation is -24%; it is very unlikely to be less than -50% and is very unlikely to be more than 4%. A wider range of uncertainty is from -50% to 11%.

Winter precipitation

2020s winter mean precipitation

Under **low** emissions, the central estimate of change in winter mean precipitation is 6%; it is very unlikely to be less than -2% and is very unlikely to be more than 16%. A wider range of uncertainty is from -2% to 16%.

Under **medium** emissions, the central estimate of change in winter mean precipitation is 5%; it is very unlikely to be less than -2% and is very unlikely to be more than 16%. A wider range of uncertainty is from -2% to 16%.

Under **high** emissions, the central estimate of change in winter mean precipitation is 6%; it is very unlikely to be less than -1% and is very unlikely to be more than 16%. A wider range of uncertainty is from -2% to 16%.

2050s winter mean precipitation

Under **low** emissions, the central estimate of change in winter mean precipitation is 11%; it is very unlikely to be less than 1% and is very unlikely to be more than 25%. A wider range of uncertainty is from 1% to 33%.

Under **medium** emissions, the central estimate of change in winter mean precipitation is 14%; it is very unlikely to be less than 2% and is very unlikely to be more than 29%. A wider range of uncertainty is from 1% to 33%.

Under **high** emissions, the central estimate of change in winter mean precipitation is 15%; it is very unlikely to be less than 3% and is very unlikely to be more than 33%. A wider range of uncertainty is from 1% to 33%.

2080s winter mean precipitation

Under **low** emissions, the central estimate of change in winter mean precipitation is 15%; it is very unlikely to be less than 3% and is very unlikely to be more than 32%. A wider range of uncertainty is from 3% to 53%.

Under **medium** emissions, the central estimate of change in winter mean precipitation is 18%; it is very unlikely to be less than 3% and is very unlikely to be more than 41%. A wider range of uncertainty is from 3% to 53%.

Under **high** emissions, the central estimate of change in winter mean precipitation is 25%; it is very unlikely to be less than 6% and is very unlikely to be more than 53%. A wider range of uncertainty is from 3% to 53%.

Annex L How to Describe a Risk (Nottingham City Council)

Document available on request from Nottingham City Council

Annex M Step-by-Step Instructions for LSP Objectives NI 188 Risk Assessments

Please follow the following versions of Parts d) to g) of Section 4 for the risk assessments of the LSP objectives

d) Identification of Risks

During the interview and/or team meeting with the service area manager and officers, the CAPOs are to identify and score the threats and opportunities to the service area and/or LSP objective. The CAPOs will use the list of potential threats and impacts provided in the CAPO Pack during the interview to aid risk identification. **Please Note:** the list provided is not exhaustive. The CAPOs are encouraged to ask staff for ideas of any further risks.

For each LSP objective, the CAPOs are to:

i. List the LSP indicator affected for the LSP objective (Column B). Each relevant indicator that should be assessed will be listed here. These will all be taken from the Sustainable Community Strategy of the LSP's local authority. This list is not exhaustive and further indicators that are believed to relevant can be added, or others can be deleted. Each of these indicators will be considered separately with the predicted changes in climate.

ii. Work through the future climatic conditions (Column C) and corresponding impact categories (Column D) to identify conditions and impacts which are expected to affect the service area.

Definitions of Impacts: There exist various definitions of certain weather-related impacts, for example, heat waves can be defined as a period of over five consecutive days with daily maximum temperatures of $5^{o}C$ or more above the average maximum temperature, as recommended by the World Meteorological Organisation (Frich *et al.* 2002). Due to the use of absolute differences from average temperatures to classify heat waves, the inconsistencies in the availability of definitions for weather events and the effect of differences in locations, for this stage of the NI 188 risk assessment the range of values from the UKCP09 scenarios will be used rather than definitions of specific impacts. Please refer to the Glossary for definitions used within this project.

iii. Identify the threats and/or opportunities (Column E) to the service area which have the potential to disrupt service delivery resulting from the impact and the projected future climatic conditions.

iv. Identify the consequences (Column F) of each threat/opportunity by considering the relevant receptor categories, i.e. who or what is impacted, and identify the effect on the delivery of the LSP objective (Column G).

v. Identify who or what is affected (the receptor category) (Column F) for each consequence from the drop-down menu.

Please Note:

- There may be more than one receptor per consequence, please enter each receptor as a separate row to enable to the assessment of the impact of the threat/opportunity on each receptor separately.

vi. Assign a reference number to each row of the template in the "Id Ref" (Column A & I), distinguishing between different receptors (roman numerals), different consequences (letters) and different threats/opportunities (numbers). For example, the 1st receptor of the 1st consequence of the 1st identified risk would be referenced as 1ai; the 2nd receptor of the 1st consequence of the 1st threat/opportunity as 1aii; the 1st receptor of the 2nd consequence of the 2nd threat/opportunity as 2bi.

vii. Identify any current measures in place which will reduce the likelihood of the occurrence of the consequence and/or the severity of the consequence (Column H).

e) Assessment of Scores of Likelihood & Severity

For each receptor of each consequence, please complete the following:

i. Confirm timescales to be considered as the 2020s.

ii. Assess "likelihood of occurrence of consequence" score using **Table A (Annex A)** for each timescale separately (Column J), entering the score (1 – 5) from the drop-down menu into the risk assessment template and noting reason for assignment in notes column (Column O).

iii. Assess "severity of the consequence of the threat/opportunity" score using **Table B (Annex B)** for each timescale separately (Column K), entering the score (1 – 5) from the drop-down menu into the risk assessment template and noting reason for assignment in notes column (Column O).

Please Note:

- The assessment of (ii) and (iii) are to be conducted separately. For (ii) please consider the likelihood of occurrence of the consequence, regardless of the severity of the consequence. For (iii) please consider the severity of consequence, regardless of the likelihood of occurrence of the consequence.
- Please consider the current state of the service assets and systems when completing the risk assessment to identify the **Residual Risk** (See Glossary). For example, consider the current state of insulation and air circulation in buildings generally when assessing the risk of heat waves.
- The reason for the assignment of the score for each is to be noted in the risk assessment notes column in the template. This is essential to enable

comparison of assignments in regional review of the assessment and to inform future reviews of the risk assessment. The definitions for probability of occurrence are quite short. However, because the impact of the threat/opportunity, should it occur, can be much wider, we have a more comprehensive set of definitions.

f) Calculation of Risk Score

The score levels assigned to the "likelihood of consequence" and "severity of impact" are multiplied to provide the risk score:

Risk Score = Likelihood of Consequence x Severity of Impact

i. The template has been set up to automatically calculate the risk score in the appropriate timescale column (Column L). Please view the 5x5 risk matrix (**Table C Annex C**) to see the relation between the "likelihood of consequence", "severity of impact" and risk number scores. **Please Note: initially the cells for the Risk Score are to be filled in as green**, as the cells will only change to yellow, orange and red automatically due to the limit of 3 categories in the conditional format.

ii. Match the risk score to the risk category in (**Table D Annex D**) and colour the risk score box in the appropriate colour for the category.

iii. Indicate whether the consequence is a threat or an opportunity by selecting either the "-" or "+" sign, respectively (Column M).

iv. Climate prediction for the 2020's are only considered for this risk assessment to as business plans that tend to be produced for short-term periods. If, however, a threat/opportunity will affect the objectives in the long term (such as housing and planning, for example), it is possible to choose an "*" from the dropdown menu to highlight this (Column N). It will then be possible to filter the data for long-term risks if completing the assessment.

g) Optional Information

Within the risk assessment template a number of columns are optional (Columns T – Z; in grey). Please Note: The additional information gathered in these columns will inform the development of the Adaptation Action Plan, during work towards higher levels of NI 188. Therefore, where possible, please fill in the additional columns where the information is highlighted in the interviews and/or available through previous work. Where information is provided on costs (Column U) and resource requirements (Column V, a drop-down menu), please note the accuracy of the information (e.g. expected range, estimate, initial quote, final quote).

Please refer to Part h) in Section 4 of the main document for the remainder of the methodology

Annex N Worked Example of the NI 188 Risk Assessment

The following is a worked example using the NI 188 risk assessment methodology.

Please Note: the figures in this example are fictional

Service Area: Adult Social Care
Impact: Heat wave
Future climate conditions (leading to impact): Mean summer temperature
Weather event (leading to impact): High temperatures

a) Timescale: Initial all three timescales are considered. 2020s selected for risk assessment.

b) UKCP09 Scenarios: Referred to values listed for the 2020s for mean summer temperature.

c) Scope of Assessment: Adult social care including residential care

d) Identification of Threats/Opportunities

- **i.** Future climatic condition: Increasing summer temperatures
- **ii.** Impact type: Heat waves
  List of potential threat/opportunity with the service area manager and officers through interview and/or team meeting and reference number: e.g. negative health impact on vulnerable people & Ref. number: 1a
- **iii.** Consequence: Death
- **iv.** Receptor: Citizen – vulnerable people
- **v.** Measures in place: air conditioning in all care homes

e) Assessment of Scores of Likelihood & Severity

For each threat/opportunity the following are to be completed:

- **i.** Confirm timescales to be considered: 2020s main focus
- **ii.** Assess "likelihood of occurrence of consequence" score using Table A Annex A:
  Building conditions: air well circulated. Therefore Likelihood score = 2
- **iii.** Assess "severity of impact" score using Table B Annex B:
  Potential consequence: Death. Therefore Severity score: 5

f) Calculation of Risk Score

The score levels assigned to the "likelihood of consequence" and "severity of impact" are multiplied to provide the risk score:

- **i.** Using the 5x5 risk matrix (Table C Annex C), risk score = 2 x 5 = 10. Data and reason for assignment of levels entered into Excel risk assessment template for the impact of a heat wave on Adult Social Services (ASSHH) in 2020s (Table N1).
- **ii.** Coloured cell in template to indicate risk category (Table D Annex D).
- **iii.** Indicate threat or opportunity: Risk ("-" negative sign selected)

Please Note the figures in this example are fictional

Table N1: Risk Assessment Template

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Step 1a&b: Risk Assessment Form for Local Authorities					Conduct risk assessment of local authority service areas using							
2	© East Midlands NI 188 Planning to Adapt Project 2009-2010					Risk Assessment Methodology and 5x5 Matrix							
3		Name of Local Authority:		Service Area Assessed:		Date of CRA:		Date of Review:					
4	PLEASE NOTE: You are REQUIRED TO USE THE RISK ASSESSMENT METHODOLOGY DOCUMENT during template completion												
5	A	B	C	D	E	F	G	H	I	J	K	L	M
6								Threat/Opport'y *8 & Timescales *9					
7	Ref. No. *1	Future climatic condition *2	Impact *3	Identified Threat and/or Opportunity *4	Consequence * 5	Who or What is Impacted *6	Control Measures or Safeguards currently in place *7	Likelihood of consequence *10			Severity of consequence *11		
8								2020s	2050s	2080s	2020s	2050s	2080s
9	1ai	**Increasing summer temperatures** The projected changes are: *Increase* in **summer mean temperature** is: 0.4 (1.4) 2.5°C by 2020s / 1.1 (2.5) 4.7°C by 2050s / 1.2 (3.5) 7.3°C by 2080s; *Increase* in **summer mean daily maximum** is: 0.5 (1.9) 3.5°C by 2020s / 1.1 (3.3) 6.6°C by 2050s / 1.2 (4.7) 10.3°C by 2080s; *Increase* in **summer mean daily minimum** is: 0.6 (1.5) 2.7°C by 2020s / 1.1 (2.7) 5.5°C by 2050s / 1.3 (3.8) 8.2°C by 2080s.	Heat waves	High temperatures in care homes	Overheating in care homes	Customer/Citizen	Air conditioning	2			5		

Table N1 continued: Risk Assessment Template

	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1					Step 1a&b: Risk Assessment Form for Local Authorities								
2					© East Midlands NI 188 Planning to Adapt Project 2009-2010								
3							Name of Local Authority:				Service Area Assessed:		
4	PLEASE NOTE: You are REQUIRED TO USE THE RISK ASSESSMENT METHODOLOGY DOCUMENT during template completion												
5	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
6	Risk Score					Threat/Opport'y	Potential Adaptation Measures *14						
7	Risk Number *12			+ve or -ve *17	Ref. No. *1	Notes of Decision of Assignment *13	Observations and recommendations to reduce vulnerability *14	Cost* 14	Resource Requirements *15	Action required by whom *16	Coordinated response required with other local authority areas? *16	Date action required by: *16	Date action completed: *16
8	2020s	2050s	2080s										
9	10	0	0	-	1ai		Ensure air conditioning units are regularly maintained						

Please Note the figures in this example are fictional

Annex O NI 188 Risk Assessment Templates

The NI 188 Risk Assessment Templates are available in a Microsoft Excel format accompanying this document and covered by copyright of this document. © East Midlands NI 188 Planning to Adapt Project 2009-2010.

Please find below copies of the NI 188 Comprehensive Risk Assessment (CRA) templates for:

O1 Council Service Areas

O2 Collation of Council Service Areas

O3 Local Strategic Partnership (LSP) Objectives

O4 Collation of LSP Objectives

O5 LSP Organisations

O6 Collation of LSP Organisations

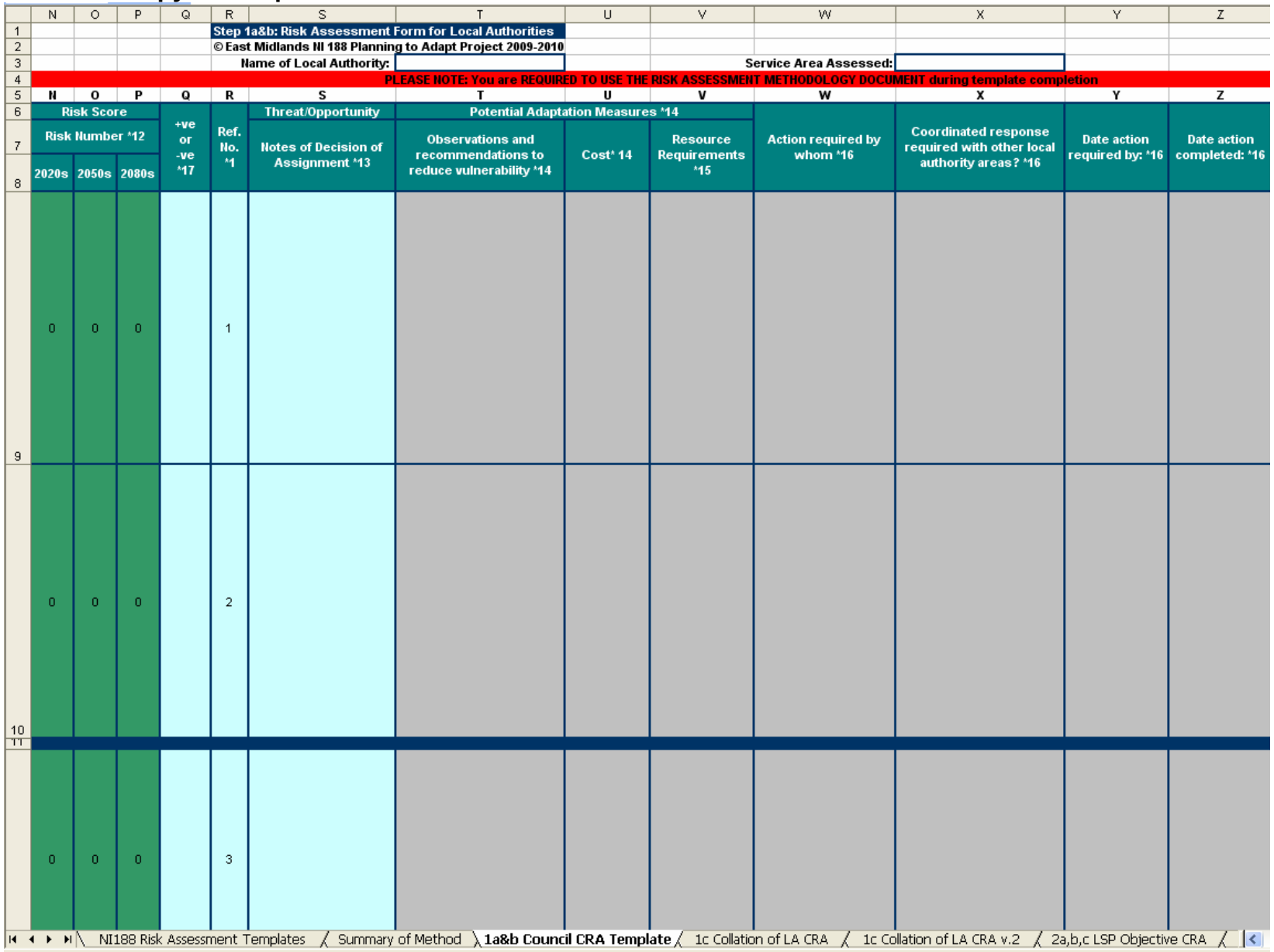
O7 Collation of regional CRAs including Council Service Areas, LSP Objectives and LSP Organisations

Table O1: Copy of Template for CRA of Council Service Areas

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Step 1a&b: Risk Assessment Form for Local Authorities					Conduct risk assessment of local authority service areas using							
2	© East Midlands NI 188 Planning to Adapt Project 2009-2010					Risk Assessment Methodology and 5x5 Matrix							
3		Name of Local Authority:		Service Area Assessed:		Date of CRA:		Date of Review:					
4	PLEASE NOTE: You are REQUIRED TO USE THE RISK ASSESSMENT METHODOLOGY DOCUMENT during template completion												
5	A	B	C	D	E	F	G	H	I	J	K	L	M
6								Threat/Opportunity *8 & Timescales *9					
7	Ref. No. *1	Future climatic condition *2	Impact *3	Identified Threat and/or Opportunity *4	Consequence * 5	Who or What is Impacted *6	Control Measures or Safeguards currently in place *7	Likelihood of consequence *10			Severity of consequence *11		
8								2020s	2050s	2080s	2020s	2050s	2080s
9	1	**Increasing summer temperatures** The projected changes are: *Increase* in **summer mean temperature** is: 0.4 (1.4) 2.5°C by 2020s / 1.1 (2.5) 4.7°C by 2050s / 1.2 (3.5) 7.3°C by 2080s; *Increase* in **summer mean daily maximum** is: 0.5 (1.9) 3.5°C by 2020s / 1.1 (3.3) 6.6°C by 2050s / 1.2 (4.7) 10.3°C by 2080s; *Increase* in **summer mean daily minimum** is: 0.6 (1.5) 2.7°C by 2020s / 1.1 (2.7) 5.5°C by 2050s / 1.3 (3.8) 8.2°C by 2080s.	Higher summer temperatures										
10	2	**Increasing summer temperatures** The projected changes are: *Increase* in **summer mean temperature** is: 0.4 (1.4) 2.5°C by 2020s / 1.1 (2.5) 4.7°C by 2050s / 1.2 (3.5) 7.3°C by 2080s; *Increase* in **summer mean daily maximum** is: 0.5 (1.9) 3.5°C by 2020s / 1.1 (3.3) 6.6°C by 2050s / 1.2 (4.7) 10.3°C by 2080s; *Increase* in **summer mean daily minimum** is: 0.6 (1.5) 2.7°C by 2020s / 1.1 (2.7) 5.5°C by 2050s / 1.3 (3.8) 8.2°C by 2080s.	Heat waves										
11													
	3	**Increasing winter temperature** The projected changes are: *Increase* in **winter mean temperature** is: 0.5 (1.3) 2.2°C by 2020s / 0.9 (2.2) 3.8°C by 2050s / 1.4 (3.0) 5.5°C by 2080s. ** Even though winter temperatures are projected to increase it is inevitable that cold spells and associated frost,	Milder winters										

NI188 Risk Assessment Templates | Summary of Method | 1a&b Council CRA Template | 1c Collation of LA CRA | 1c Collation of LA CRA v.2 | 2a,b,c LSP Objective CRA

Table O1: Copy of Template for CRA of Council Service Areas continued



	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1					Step 1a&b: Risk Assessment Form for Local Authorities								
2					© East Midlands NI 188 Planning to Adapt Project 2009-2010								
3					Name of Local Authority:					Service Area Assessed:			
4	PLEASE NOTE: You are REQUIRED TO USE THE RISK ASSESSMENT METHODOLOGY DOCUMENT during template completion												
5	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
6	Risk Score			+ve or -ve ^17	Ref. No. ^1	Threat/Opportunity	Potential Adaptation Measures ^14			Action required by whom ^16	Coordinated response required with other local authority areas? ^16	Date action required by: ^16	Date action completed: ^16
7	Risk Number ^12					Notes of Decision of Assignment ^13	Observations and recommendations to reduce vulnerability ^14	Cost' 14	Resource Requirements ^15				
8	2020s	2050s	2080s										
9	0	0	0		1								
10	0	0	0		2								
11													
	0	0	0		3								

NI188 Risk Assessment Templates | Summary of Method | 1a&b Council CRA Template | 1c Collation of LA CRA | 1c Collation of LA CRA v.2 | 2a,b,c LSP Objective CRA

Table O2: Copy of Template for Collation of CRA of Council Service Areas

	A	B	C	D	E	F	G
1	**Step 1c: Collation of Local Authority Risk Assessment Forms**					**Collate local authority risk assessment scores in East**	
2	**© East Midlands NI 188 Planning to Adapt Project 2009-2010**						
3		**Name of Region:**		**Date of Collation:**			
4	**PLEASE NOTE: You are REQUIRED TO USE THE RISK ASSESSMENT METHODOLOGY DOCUMENT during template completion**						
5	**A**	**B**	**C**	**D**	**E**	**F**	**G**
6							
7	**Ref. No. *1**	**Future climatic condition *2**	**Impact *3**	**Identified Threat and/or Opportunity *4**	**Consequence * 5**	**Who or What is Impacted *6**	**Control Measures or Safeguards currently in place *7**
8							
9	Eg. 1ai	**Increasing winter precipitation** The projected changes are: Increase in **winter mean precipitation** is: -2 (6) 16% by 2020s / 1 (14) 33% by 2050s / 3 (18) 53% by 2080s	Periods of heavy and / or persistent rain	Pluvial flooding (flash floods from rainfall)	Closure of roads - disruption to delivery of services	Logistics/Infrastructure	
10	E.g 1aii					Customer/Citizen	
11	1	**Increasing summer temperatures** The projected changes are: *Increase* in **summer mean temperature** is: 0.4 (1.4) 2.5 °C by 2020s / 1.1 (2.5) 4.7 °C by 2050s / 1.2 (3.5) 7.3 °C by 2080s; *Increase* in **summer mean daily maximum** is: 0.5 (1.9) 3.5 °C by 2020s / 1.1 (3.3) 6.6 °C by 2050s / 1.2 (4.7) 10.3 °C by 2080s; *Increase* in **summer mean daily minimum** is: 0.6 (1.5) 2.7 °C by 2020s / 1.1 (2.7) 5.5 °C by 2050s / 1.3 (3.8) 8.2 °C by 2080s.	Higher summer temperatures				
12	2	**Increasing summer temperatures** The projected changes are: *Increase* in **summer mean temperature** is: 0.4 (1.4) 2.5 °C by 2020s / 1.1 (2.5) 4.7 °C by 2050s / 1.2 (3.5) 7.3 °C by 2080s; *Increase* in **summer mean daily maximum** is: 0.5 (1.9) 3.5 °C by 2020s / 1.1 (3.3) 6.6 °C by 2050s / 1.2 (4.7) 10.3 °C by 2080s; *Increase* in **summer mean daily minimum** is: 0.6 (1.5) 2.7 °C by 2020s / 1.1 (2.7) 5.5 °C by 2050s / 1.3 (3.8) 8.2 °C by	Heat waves				
13							
14	3	**Increasing winter temperature** The projected changes are: *Increase* in **winter mean temperature** is: 0.5 (1.3) 2.2 °C by 2020s / 0.9 (2.2) 3.8 °C by 2050s / 1.4 (3.0) 5.5 °C by 2080s. ** Even though winter temperatures are projected to increase it is inevitable that cold spells and associated frost, snow and ice	Milder winters				

NI188 Risk Assessment Templates | Summary of Method | 1a&b Council CRA Template | **1c Collation of LA CRA** | 1c Collation of LA CRA v.2 | 2a,b,c LSP Objective CRA

Table O2: Copy of Template for Collation of CRA of Council Service Areas continued

	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD
1	Step 1a&b: Risk Assessment Form for Local Authorities																						
2	© East Midlands NI 188 Planning to Adapt Project 2009-2010																						
3																							
4																							
5	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD
6		LA 2020s Risk Number ^12					LA 2050s Risk Number ^12					LA 2080s Risk Number ^12					Risk Number Grouping ^16					Potential Adaptation Measures ^14	
7	Ref. No. ^1	Rutland CC	Leic City C	Leics CC	Derbyshire	Etc	Rutland CC	Leic City C	Leics CC	Derbyshire	Etc	Rutland CC	Leic City C	Leics CC	Derbyshire	Etc	2020s	2050s	2080s	+ve or -ve ^18	Control Measures or Safeguards currently in place ^7	Observations and recommendations to reduce vulnerability ^14	Cost^ 14
8																							
9	Eg. 1ai	9	12	8	6	8	16	16	15	12	12	20	25	20	16	20	Regional	Sub-regional	Regional		Clearance of road drains; Development Plans	Increase frequency of drainage clearing to once every 3 years; Ensure road development in low flood risk areas; Ensure road, housing and service development in low flood risk areas	
10	E.g 1aii	12					16					25					Regional	Regional County Councils Primarily	Regional		Clearance of road drains; Plan of alternative routes; River level monitoring system	Increase frequency of drainage clearing to once every 3 years; GPS systems updated to receive weather warning locations; Provide linkage of river level monitoring to GPS software to redirect	
11	1																						
12																							
13																							
	3																						

NI188 Risk Assessment Templates | Summary of Method | 1a&b Council CRA Template | **1c Collation of LA CRA** | 1c Collation of LA CRA v.2 | 2a,b,c LSP Objective CRA

Table O2: Copy of Template for Collation of CRA of Council Service Areas continued

	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ
1	Step 1a&b: Risk Assessment Form for Local Authorities																					
2	© East Midlands NI 188 Planning to Adapt Project 2009-2010																					
3																						
4																						
5	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ
6					LA 2020s Risk Number ^12					LA 2050s Risk Number ^12					LA 2080s Risk Number ^12					Risk Number Grouping ^16		
7	Ref. No. ^1	Action required by whom ^16	Date action required by: ^16	Date action completed: ^16	Rutland CC	Leic City C	Leics CC	Derbyshire	Etc	Rutland CC	Leic City C	Leics CC	Derbyshire	Etc	Rutland CC	Leic City C	Leics CC	Derbyshire	Etc	2020s	2050s	2080s
8																						
9	Eg. 1ai	Highways/Land-owners/Farmers; Planning			Low regret	Low regret	Low regret	Low regret	Low regret	Win Win	Win Win	Win Win	Low regret	Low regret	Win Win	Win Win	Win Win	Win Win	Win Win	Regional	Sub-regional	Regional
10	E.g 1aii	Highways/Land-owners/Farmers; Emergency Services/Highways; Environment Agency/Emergency Services			Low regret	Low regret	Low regret	Low regret	Low regret	Low regret	Low regret	Low regret	Low regret	Low regret	Win Win	Win Win	Win Win	Win Win	Win Win	Regional	Regional County Councils Primarily	Regional
11	1																					
12																						
13																						
	3																					

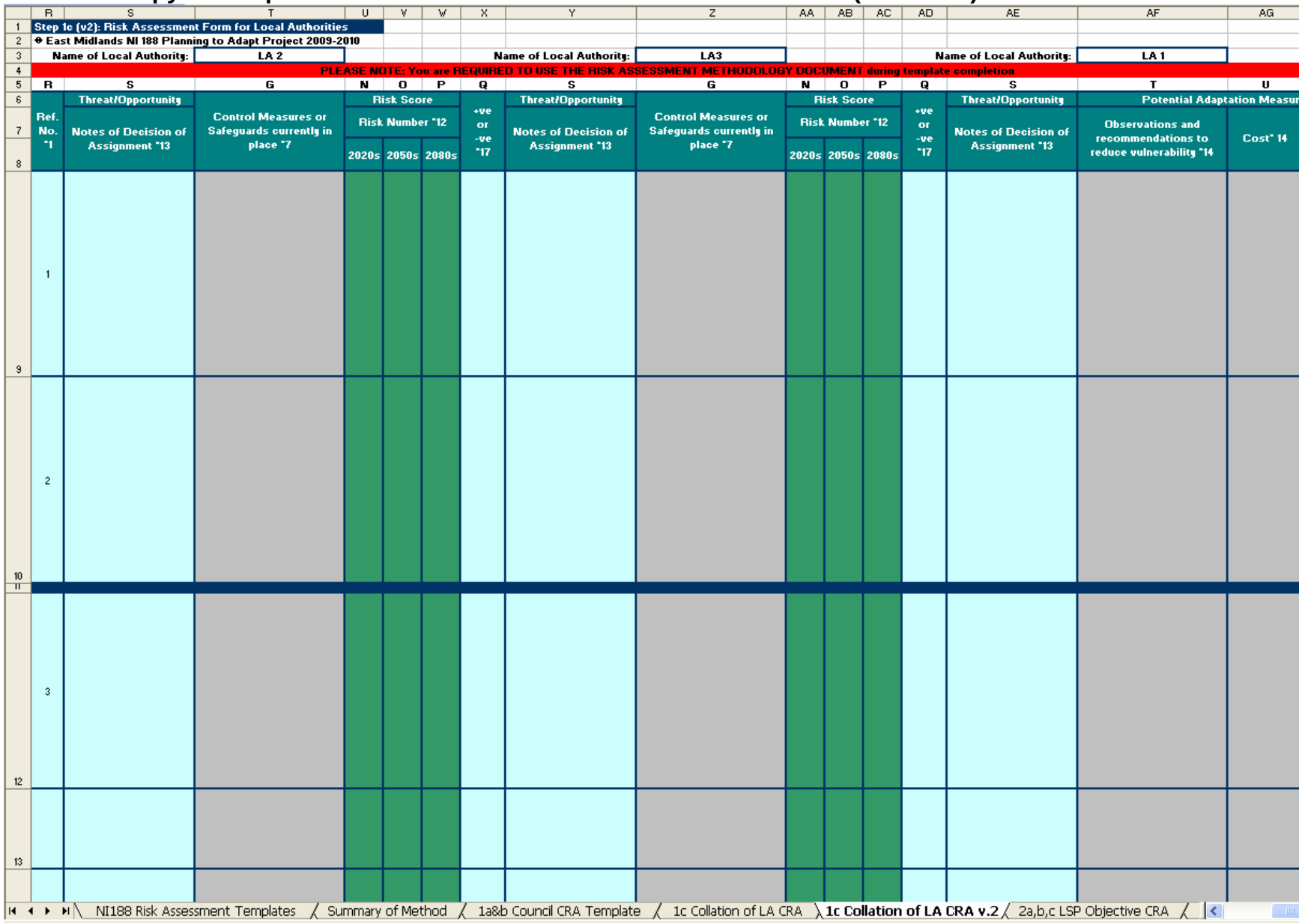
NI188 Risk Assessment Templates | Summary of Method | 1a&b Council CRA Template | **1c Collation of LA CRA** | 1c Collation of LA CRA v.2 | 2a,b,c LSP

Table O2: Copy of Template for Collation of CRA of Council Service Areas (Alterative) continued

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	Step 1c (v2): Risk Assessment Form for Local Authorities					Conduct risk assessment of local authority service areas using											
2	❖ East Midlands NI 188 Planning to Adapt Project 2009-2010					Risk Assessment Methodology and 5x5 Matrix											
3		Name of Local Authority:	LA 1	Service Area Assessed:		Date of CRA:		Date of Review:									
4	PLEASE NOTE: You are REQUIRED TO USE THE RISK ASSESSMENT METHODOLOGY DOCUMENT during template completion																
5	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
6								Threat/Opportunity *8 & Timescales *9						Risk Score			
7	Ref. No. *1	Future climatic condition *2	Impact *3	Identified Threat and/or Opportunity *4	Consequence * 5	Who or What is Impacted *6	Control Measures or Safeguards currently in place *7	Likelihood of consequence *10			Severity of consequence *11			Risk Number *12			+ve or -ve *17
8								2020s	2050s	2080s	2020s	2050s	2080s	2020s	2050s	2080s	
9	1	**Increasing summer temperatures** The projected changes are: *Increase* in **summer mean temperature** is: 0.4 (1.4) 2.5 °C by 2020s / 1.1(2.5) 4.7°C by 2050s / 1.2 (3.5) 7.3°C by 2080s; *Increase* in **summer mean daily maximum** is: 0.5 (1.9) 3.5°C by 2020s / 1.1(3.3) 6.6°C by 2050s / 1.2 (4.7) 10.3°C by 2080s; *Increase* in **summer mean daily minimum** is: 0.6 (1.5) 2.7°C by 2020s / 1.1(2.7) 5.5°C by 2050s / 1.3 (3.8) 8.2°C by 2080s.	Higher summer temperatures											0	0	0	
10	2	**Increasing summer temperatures** The projected changes are: *Increase* in **summer mean temperature** is: 0.4 (1.4) 2.5 °C by 2020s / 1.1(2.5) 4.7°C by 2050s / 1.2 (3.5) 7.3°C by 2080s; *Increase* in **summer mean daily maximum** is: 0.5 (1.9) 3.5°C by 2020s / 1.1(3.3) 6.6°C by 2050s / 1.2 (4.7) 10.3°C by 2080s; *Increase* in **summer mean daily minimum** is: 0.6 (1.5) 2.7°C by 2020s / 1.1(2.7) 5.5°C by 2050s / 1.3 (3.8) 8.2°C by 2080s.	Heat waves											0	0	0	
11																	
12	3	**Increasing winter temperature** The projected changes are: *Increase* in **winter mean temperature** is: 0.5 (1.3) 2.2°C by 2020s / 0.9 (2.2) 3.8°C by 2050s / 1.4 (3.0) 5.5°C by 2080s. ** Even though winter temperatures are projected to increase it is inevitable that cold spells and associated frost, snow and ice events will occur (albeit at a lower frequency)	Milder winters											0	0	0	
13		**Increasing winter temperature** The projected changes are: *Increase* in **winter mean temperature** is: 0.5 (1.3) 2.2°C by 2020s / 0.9 (2.2) 3.8°C by 2050s /	Milder winters											0	0	0	
		Increasing winter temperature The projected changes are:															

NI188 Risk Assessment Templates | Summary of Method | 1a&b Council CRA Template | 1c Collation of LA CRA | **1c Collation of LA CRA v.2** | 2a,b,c LSP Objective CRA

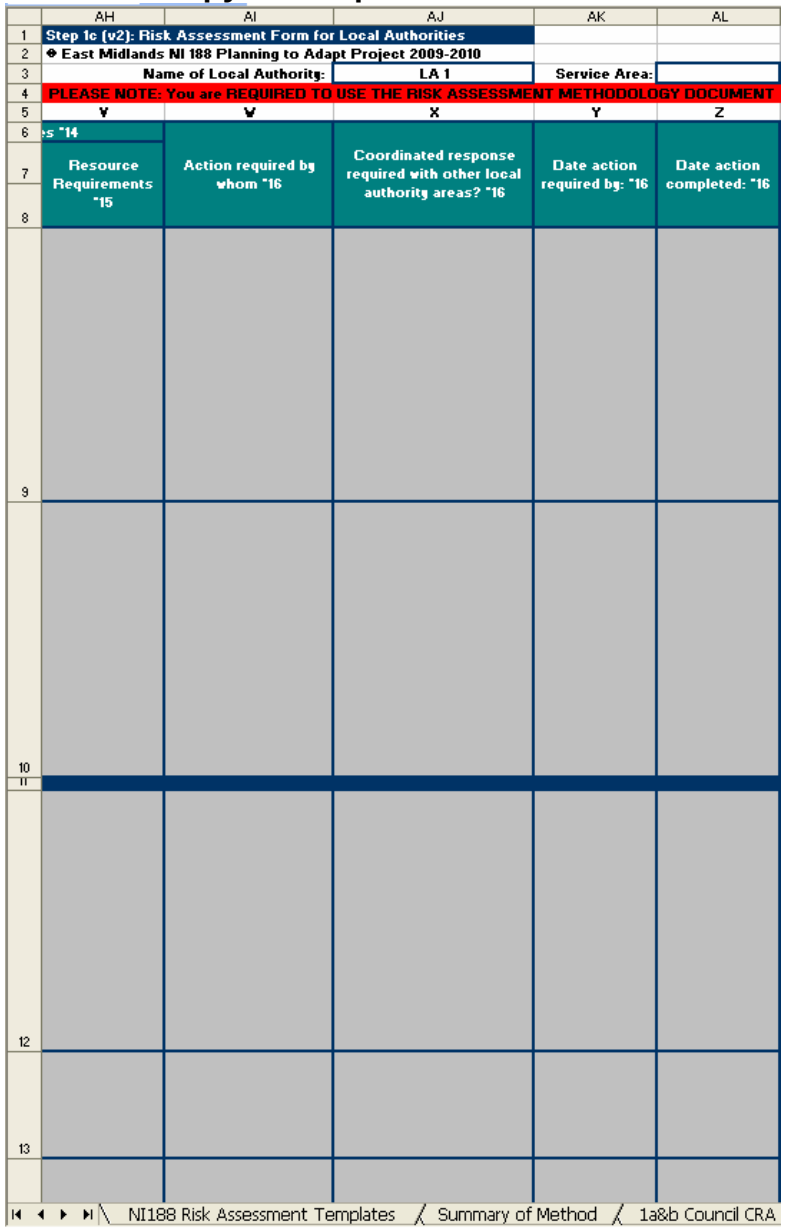
Table O2: Copy of Template for Collation of CRA of Council Service Areas (Alterative) continued



	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG
1	Step 1c (v2): Risk Assessment Form for Local Authorities															
2	❖ East Midlands NI 188 Planning to Adapt Project 2009-2010															
3	Name of Local Authority:		LA 2				Name of Local Authority:		LA3				Name of Local Authority:		LA 1	
4	PLEASE NOTE: You are REQUIRED TO USE THE RISK ASSESSMENT METHODOLOGY DOCUMENT during template completion															
5	R	S	G	N	O	P	Q	S	G	N	O	P	Q	S	T	U
6		Threat/Opportunity		Risk Score				Threat/Opportunity		Risk Score				Threat/Opportunity	Potential Adaptation Measur	
7	Ref. No. *1	Notes of Decision of Assignment *13	Control Measures or Safeguards currently in place *7	Risk Number *12			+ve or -ve *17	Notes of Decision of Assignment *13	Control Measures or Safeguards currently in place *7	Risk Number *12			+ve or -ve *17	Notes of Decision of Assignment *13	Observations and recommendations to reduce vulnerability *14	Cost* 14
8				2020s	2050s	2080s				2020s	2050s	2080s				
9	1															
10	2															
11																
12	3															
13																

NI188 Risk Assessment Templates | Summary of Method | 1a&b Council CRA Template | 1c Collation of LA CRA | **1c Collation of LA CRA v.2** | 2a,b,c LSP Objective CRA

Table O2: Copy of Template for Collation of CRA of Council Service Areas (Alterative) continued



	AH	AI	AJ	AK	AL
1	Step 1c (v2): Risk Assessment Form for Local Authorities				
2	East Midlands NI 188 Planning to Adapt Project 2009-2010				
3	Name of Local Authority:		LA 1	Service Area:	
4	PLEASE NOTE: You are REQUIRED TO USE THE RISK ASSESSMENT METHODOLOGY DOCUMENT				
5	V	W	X	Y	Z
6	s "14				
7	Resource Requirements "15	Action required by whom "16	Coordinated response required with other local authority areas? "16	Date action required by: "16	Date action completed: "16
8					
9					
10					
11					
12					
13					

NI188 Risk Assessment Templates | Summary of Method | 1a&b Council CRA

Table O3: Copy of Template for CRA of LSP Objectives

1	Step 2a,b,c: Risk Assessment Form for LSP Objectives for Collation						
2	© East Midlands NI 188 Planning to Adapt Project 2009-2010						
3		Name of LSP:		Date of CRA:		Date of Review:	
4	PLEASE NOTE: You are REQUIRED TO USE THE RISK ASSESSMENT METHODOLOGY DOCUMENT during template completion						
5	A	B	C	D	E	F	G
6	Ref No *1	LSP Sub-objective Affected	Future climatic condition *2	Impact *3	Identified Threat or Opportunity *4	Consequence * 5	Effect on Delivery of Objective *18	Threat Versus Opportunity *17
9	1	Example	**Increasing summer temperatures** The middle central estimate of projected: *Increase* in **summer mean temperature** is: 1.4°C by 2020s / 2.5°C by 2050s / 3.5°C by 2080s; *Increase* in **summer mean daily maximum** is: 1.9°C by 2020s / 3.3°C by 2050s / 4.7°C by 2080s; *Increase* in **summer mean daily minimum** is: 1.5°C by 2020s / 2,7°C by 2050s / 3.8°C by 2080s.	Higher summer temperatures				
10	2			Heat waves				
11	3		**Increasing winter temperature** The middle central estimate of projected: *Increase* in **winter mean temperature** is: 1.3°C by 2020s / 2.2°C by 2050s / 3.0°C by 2080s. ** Even though winter temperatures are projected to increase it is inevitable that cold spells and associated frost, snow and ice events will occur (albeit at a lower frequency)	Milder winters				
12	4			** Low temperatures / Cold spells				
13	5			** Frost / Snow / Ice				
14	6		**Decreasing summer precipitation** The middle central estimate of projected: *Decrease* in **summer mean precipitation** is: -5% by 2020s / -15% by 2050s / -19% by 2080s	Drought				
15	7		**Increasing winter precipitation** The middle central estimate of projected: *Increase* in **winter mean precipitation** is: 6% by 2020s / 14% by 2050s / 18% by 2080s	Periods of heavy and / or persistent rain				
16	8		**Combined climatic effects**	Storms / High winds				
17	9			Lightning				
18	10			Fog / Mist / Low cloud				
19	11		**Indirect impacts resulting from climate change**	Power disruption				
20	12			Sea level rise				
21	13			Climate enforced immigration				
22	14			Social disorder				
24	1		**Increasing summer temperatures**	Higher summer temperatures				

NI188 Risk Assessment Templates | Summary of Method | 1a&b Council CRA Template | 1c Collation of LA CRA | 1c Collation of LA CRA v.2 | **2a,b,c LSP Objective CRA**

Table O3: Copy of Template for CRA of LSP Objectives continued

1	Step 2a,b,c: Risk Assessment Form for LSP Objectives for Collation										
2	© East Midlands NI 188 Planning to Adapt Project 2009-2010										
3		Name of LSP:				Date of CRA:			Date of Review:		
4	PLEASE NOTE: You are REQUIRED TO USE THE RISK ASSESSMENT METHODOLOGY DOCUMENT during template completion										
5		H	I	J	K	L	M	N	O	P	Q
6	Ref	Control Measures or	Risk Rating *8			Risk		Adaptation Planning			
7	No	Safeguards currently	Likelihood of	Severity of	Risk Number	Risk to Long Term	Notes on Decision of	Potential Adaptation	Resource	Action Required by	Acion Required by
8	*1	in place *7	consequence	consequence	*12	Planning? *19	Assignment (trigger points,	Measures (including costs)	Requirements *15	Whom *16	When
9	1				0						
10	2				0						
11	3				0						
12	4				0						
13	5				0						
14	6				0						
15	7				0						
16	8				0						
17	9				0						
18	10				0						
19	11				0						
20	12				0						
21	13				0						
22	14				0						
24	1				0						

NI188 Risk Assessment Templates / Summary of Method / 1a&b Council CRA Template / 1c Collation of LA CRA / 1c Collation of LA CRA v.2 / 2a,b,c LSP Objective CRA

Table O4: Copy of Template for Collation of CRA of LSP Objectives

	A	B	C	D	E	F	G	H
1	**Step 2d: Collation of Local Authority Risk Assessment Forms**						**Collate LSP objectives across local authorities in East Midlands to identified common priorities for action**	
2	**© East Midlands NI 188 Planning to Adapt Project 2009-2010**							
3		**Name of Region:**		**Date of Collation:**				
4	**PLEASE NOTE: You are REQUIRED TO USE THE RISK ASSESSMENT METHODOLOGY DOCUMENT during template completion**							
5	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**
6								
7	**Ref No *1**	**LSP Indicator Affected**	**Future climatic condition *2**	**Impact *3**	**Identified Threat and/or Opportunity *4**	**Consequence * 5**	**Effect on Delivery of Objective *18**	**Control Measures or Safeguards currently in place *7**
8								
9	1ai	E.g. Creating cycling and walking networks and a "New Walk"; includes routes to/ from the city from all major directions as well as schools	**Increasing summer temperatures** The projected changes are: Increase in **summer mean temperature** is: 0.4 (1.4) 2.5°C by 2020s / 1.1 (2.5)	Higher summer temperatures	attractiveness of spending time outside	people more likely to walk or cycle to work	increased use	
10	2ai			Heat waves	increased chance of heat exhaustion	children and elderly advised to remain indoors	decreased use	
11	2aii					people less likely to cycle to work	decreased use of cycle paths	
12	3		**Increasing winter temperature** The projected changes are: *Increase* in **winter mean temperature** is: 0.5 (1.3) 2.2°C by 2020s / 0.9 (2.2) 3.8°C by 2050s / 1.4 (3.0) 5.5°C by 2080s	Milder winters				
13	4			** Low temperatures / Cold spells				
14	5			** Frost / Snow / Ice				
15	6		**Decreasing summer precipitation** The	Drought				
16	7ai		**Increasing winter precipitation** The projected changes are: Increase in **winter mean**	Periods of heavy and / or persistent rain	inadequate drainage	access hindered	decreased use	
17	7aii				flooding	damage to the pathways, bridges etc	decreased use	
18	8		**Combined climatic effects**	Storms / High winds	falling objects (branches etc)	injury to people walking beneath the trees	decreased number of users/ vistors	
19	9			Lightning				
20	10			Fog / Mist / Low cloud				
21	11		**Indirect impacts resulting from climate change**	Power disruption	street lighting off when dark	perception that the pathways are less safe	decreased use when dark	
22	12			Sea level rise				
23	13			Climate enforced immigration				
24	14			Social disorder				
	1	Indicator 1	**Increasing summer temperatures** The projected changes are: *Increase* in **summer mean temperature** is: 0.4 (1.4) 2.5 °C by 2020s / 1.1 (2.5) 4.7°C by 2050s / 1.2 (3.5) 7.3°C by 2080s; *Increase* in **summer mean daily maximum** is: 0.5 (1.9) 3.5°C by 2020s / 1.1 (3.3) 6.6°C by 2050s / 1.2 (4.7) 10.3°C by 2080s; *Increase* in **summer**	Higher summer temperatures				

Summary of Method | 1a&b Council CRA Template | 1c Collation of LA CRA | 1c Collation of LA CRA v.2 | 2a,b,c LSP Objective CRA | **2d Collation of LSP Obj. CRA** | 4a,b,

Table O4: Copy of Template for Collation of CRA of LSP Objectives continued

	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
1	Step 2d: Collation of Local Authority Risk Assessment Forms																
2	© East Midlands NI 188 Planning to Adapt Project 2009-2010																
3				Name of Region:					Date of Collation:								
4	PLEASE NOTE: You are REQUIRED TO USE THE RISK ASSESSMENT METHODOLOGY DOCUMENT during template completion																
5	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
6	Ref No *1	LSP Obj. 2020s Risk No. *12					Threat Versus Opportunity *17	Risk		Adaptation Planning	Resource Requirements *15					Adaptation Planning	
7		Rutland LSP	Leic City LSP	Leics LSP	Derbyshire LSP	... LSP		Risk to Long Term Planning? *19	Notes on Decision of Assignment (trigger points, etc) *13	Potential Adaptation Measures (including costs) *14	Rutland LSP	Leic City LSP	Leics LSP	Derbyshire LSP	... LSP	Action Required by Whom *16	Acion Required by When
8																	
9	1ai	3					+										
10	2ai	3					-										
11	2aii	4					-										
12	3	0															
13	4	0															
14	5	0															
15	6	0															
16	7ai	4					-										
17	7aii						-										
18	8	3					-										
19	9	0															
20	10	0															
21	11	3					-										
22	12	0															
23	13	0															
24	14	0															

Summary of Method | 1a&b Council CRA Template | 1c Collation of LA CRA | 1c Collation of LA CRA v.2 | 2a,b,c LSP Objective CRA | **2d Collation of LSP Obj. CRA** | 4a,b,

Table O5: Copy of Template for CRA of LSP Organisation

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	**Step 4: Risk Assessment Form for LSP Organisations**					**Conduct risk assessment of LSP organisation service areas using**							
2	**© East Midlands NI 188 Planning to Adapt Project 2009-2010**					**Risk Assessment Methodology and 5x5 Matrix**							
3		**Name of LSP Partner:**		**Service Area Assessed:**		**Date of CRA:**				**Date of Review:**			
4	**PLEASE NOTE: You are REQUIRED TO USE THE RISK ASSESSMENT METHODOLOGY DOCUMENT during template completion**												
5	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**
6								**Threat/Opport'y *8 & Timescales *9**					
7	**Ref. No. *1**	**Future climatic condition *2**	**Impact *3**	**Identified Threat and/or Opportunity *4**	**Consequence * 5**	**Who or What is Impacted *6**	**Control Measures or Safeguards currently in place *7**	**Likelihood of consequence *10**			**Severity of consequence *11**		
8								**2020s**	**2050s**	**2080s**	**2020s**	**2050s**	**2080s**
9	1	**Increasing summer temperatures** The projected changes are: *Increase* in **summer mean temperature** is: 0.4 (1.4) 2.5 °C by 2020s / 1.1 (2.5) 4.7°C by 2050s / 1.2 (3.5) 7.3°C by 2080s; *Increase* in **summer mean daily maximum** is: 0.5 (1.9) 3.5°C by 2020s / 1.1 (3.3) 6.6°C by 2050s / 1.2 (4.7) 10.3°C by 2080s; *Increase* in **summer mean daily minimum** is: 0.6 (1.5) 2.7°C by 2020s / 1.1 (2.7) 5.5°C by 2050s / 1.3 (3.8) 8.2°C by 2080s	Higher summer temperatures										
10	2	**Increasing summer temperatures** The projected changes are: *Increase* in **summer mean temperature** is: 0.4 (1.4) 2.5 °C by 2020s / 1.1 (2.5) 4.7°C by 2050s / 1.2 (3.5) 7.3°C by 2080s; *Increase* in **summer mean daily maximum** is: 0.5 (1.9) 3.5°C by 2020s / 1.1 (3.3) 6.6°C by 2050s / 1.2 (4.7) 10.3°C by 2080s; *Increase* in **summer mean daily minimum** is: 0.6 (1.5) 2.7°C by 2020s / 1.1 (2.7) 5.5°C by 2050s / 1.3 (3.8) 8.2°C by 2080s	Heat waves										
11													
12	3	**Increasing winter temperature** The projected changes are: *Increase* in **winter mean temperature** is: 0.5 (1.3) 2.2°C by 2020s / 0.9 (2.2) 3.8°C by 2050s / 1.4 (3.0) 5.5°C by 2080s. ** Even though winter temperatures are projected to increase it is inevitable that cold	Milder winters										

1c Collation of LA CRA | 1c Collation of LA CRA v.2 | 2a,b,c LSP Objective CRA | 2d Collation of LSP Obj. CRA | **4a,b,c LSP Organisation CRA** | 4d Collation of LSP CRA

Table O5: Copy of Template for CRA of LSP Organisation continued

	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1						Step 4: Risk Assessment Form for LSP Organisations					Conduct risk assessment of LSP organisation service areas		
2						© East Midlands NI 188 Planning to Adapt Project 2009-2010					using risk assessment methodology & 5x5 Matrix		
3							Name of LSP Partner:			Service Area Assessed:			
4													
5	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
6	Risk Score			+ve or -ve *17	Threat/Opp't	Ref. No. *1	Potential Adaptation Measures *14			Action required by whom *16	Coordinated response required with other local authority areas? *16	Date action required by: *16	Date action completed: *16
7	Risk Number *12				Notes of Decision of Assignment *13		Observations and recommendations to reduce vulnerability *14	Cost* 14	Resource Requirements *15				
8	2020s	2050s	2080s										
9	0	0	0			1							
10	0	0	0			2							
11													
	0	0	0			3							

1c Collation of LA CRA | 1c Collation of LA CRA v.2 | 2a,b,c LSP Objective CRA | 2d Collation of LSP Obj. CRA | **4a,b,c LSP Organisation CRA** | 4d Collation of LSP CRA

Table O6: Copy of Template for Collation of CRA of LSP Organisation

	A	B	C	D	E	F	G	H
1	Step 4d: Collation of Local Authority Risk Assessment Forms						Collate risk assessments of LSP organisations to find links between organisations and common priority actions	
2	© East Midlands NI 188 Planning to Adapt Project 2009-2010							
3		Name of Region:		Date of Collation:				
4	PLEASE NOTE: You are REQUIRED TO USE THE RISK ASSESSMENT METHODOLOGY DOCUMENT during template completion							
5	A	B	C	D	E	F	G	H
6								
7	Ref. No. *1	Future climatic condition *2	Impact *3	Identified Threat and/or Opportunity *4	Consequence * 5	Effect on Delivery of LSP Objective *18	Who or What is Impacted *6	Control Measures or Safeguards currently in place *7
8								
9	Eg. 1ai	**Increasing summer temperatures** The projected changes are: *Increase* in **summer mean temperature** is: 0.4 (1.4) 2.5 °C by 2020s / 1.1 (2.5) 4.7°C by 2050s / 1.2 (3.5) 7.3°C by 2080s; *Increase* in **summer mean daily maximum** is: 0.5 (1.9) 3.5°C by 2020s / 1.1 (3.3) 6.6°C by 2050s /	Heat waves	High temperatures	Mean summer temp (°C)	Water Storage		Water Shortage Warnings; Repair leakages; Promotion of grey water usage in homes; Development of new collection network
10	Eg. 2ai	**Increasing winter precipitation** The projected changes are: Increase in **winter mean precipitation** is: -2 (6) 16% by 2020s / 1 (14) 33% by 2050s / 3 (18) 53% by 2080s	Periods of heavy and / or persistent rain	Pluvial flooding (flash floods from rainfall)	Closure of roads due to flooding - disruption of service delivery	Water Storage		Clearance of road drains; Development Plans
11	Eg. 2aii					Drainage Network		Clearance of road drains; River level monitoring system; Development of new drainage network
12	1	**Increasing summer temperatures** The projected changes are: *Increase* in **summer mean temperature** is: 0.4 (1.4) 2.5 °C by 2020s / 1.1 (2.5) 4.7°C by 2050s / 1.2 (3.5) 7.3°C by 2080s; *Increase* in **summer mean daily maximum** is: 0.5 (1.9) 3.5°C by 2020s / 1.1 (3.3) 6.6°C by 2050s / 1.2 (4.7) 10.3°C by 2080s; *Increase* in **summer mean daily minimum** is: 0.6 (1.5) 2.7°C by 2020s / 1.1 (2.7) 5.5°C by 2050s / 1.3 (3.8) 8.2°C by 2080s.	Higher summer temperatures					
13		**Increasing summer temperatures** The projected changes are: *Increase* in **summer mean temperature** is: 0.4 (1.4) 2.5 °C by 2020s / 1.1 (2.5) 4.7°C by 2050s / 1.2 (3.5) 7.3°C by 2080s; *Increase* in **summer mean daily maximum** is: 0.5 (1.9) 3.5°C by 2020s / 1.1 (3.3) 6.6°C by 2050s / 1.2 (4.7) 10.3°C by 2080s;	Higher summer temperatures					

1c Collation of LA CRA | 1c Collation of LA CRA v.2 | 2a,b,c LSP Objective CRA | 2d Collation of LSP Obj. CRA | 4a,b,c LSP Organisation CRA | **4d Collation of LSP CRA**

Table O6: Copy of Template for Collation of CRA of LSP Organisation

	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1	Step 4d: Collation of Local Authority Risk Assessment Forms																	
2	© East Midlands NI 188 Planning to Adapt Project 2009-2010																	
3																		
4																		
5	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
6		LSP Obj. 2020s Risk No. ^12					Threat Versus Opportunity ^17	Threat/Opportunity	Potential Adaptation Measures ^14		Resource Requirements ^15							
7	Ref. No. ^1	Rutland LSP	Leic City LSP	Leics LSP	Derbyshire LSP	... LSP		Notes of Decision of Assignment ^13	Observations and recommendations to reduce vulnerability ^14	Cost ^ 14	Rutland LSP	Leic City LSP	Leics LSP	Derbyshire LSP	... LSP	Action required by whom ^16	Date action required by: ^16	Date action completed: ^16
8																		
9	Eg. 1ai	3					+		Combine warnings with messages of water saving tips; Increase leakage repair; Installation of large-scale grey water recycling, especially in industry; Increase water storage facilities to capture heavier winter rainfall							Water Company/Local Authority/Local Media; Water Company; Water Company/ Planning/Industry; Water Company/ Planning/Industry		
10	Eg. 2ai	3					-		Increase frequency of drainage clearing to once every 3 years; Ensure road, housing and service development in low flood risk areas							Highways/Land-owners/Farmers; Planning/Industry		
11	Eg. 2aii	4					-		Increase frequency of drainage clearing to once every 3 years; Provide linkage of river level monitoring to GPS software to redirect; Development of new drainage network							Highways/Land-owners/Farmers; Environment Agency/Water Company; Water Company/ Planning		
12		0																
13																		

1c Collation of LA CRA | 1c Collation of LA CRA v.2 | 2a,b,c LSP Objective CRA | 2d Collation of LSP Obj. CRA | 4a,b,c LSP Organisation CRA | **4d Collation of LSP CRA**

Table O7: Copy of Template for Collation of CRA for Region (Council Service Areas, LSP Objectives & LSP Organisation)

	A	B	C	D	E	F	G
1	Step 5a: Collation of Local Authority, LSP Objective & LSP Organisation Risk Assessment Forms					Collate all risk assessments to find common priority actions for organisations, sub-regions or regions to inform future working	
2	© East Midlands NI 188 Planning to Adapt Project 2009-2010						
3		Name of Region:		Date of Collation:			
4	PLEASE NOTE: You are REQUIRED TO USE THE RISK ASSESSMENT METHODOLOGY DOCUMENT during template completion						
5	A	B	C	D	E	F	G
6							
7	Ref. No. *1	Future climatic condition *2	Impact *3	Identified Threat and/or Opportunity *4	Consequence * 5	Who or What is Impacted *6	Control Measures or Safeguards currently in place *7
8							
9	Eg. 1ai	**Increasing summer temperatures** The projected changes are: *Increase* in **summer mean temperature** is: 0.4 (1.4) 2.5 °C by 2020s / 1.1 (2.5) 4.7°C by 2050s / 1.2 (3.5) 7.3°C by 2080s; *Increase* in **summer mean daily maximum** is: 0.5 (1.9) 3.5°C by 2020s / 1.1 (3.3) 6.6°C by 2050s / 1.2 (4.7) 10.3°C by 2080s; *Increase* in **summer mean daily minimum** is: 0.6 (1.5) 2.7°C by 2020s / 1.1 (2.7) 5.5°C by 2050s / 1.3 (3.8) 8.2°C by 2080s.	Heat waves	…	…	Water Storage	
10	E.g 1aii			…	…	Reducing noise pollution	
11	Eg. 2ai	**Increasing winter precipitation** The projected changes are: Increase in **winter mean precipitation** is: -2 (6) 16% by 2020s / 1 (14) 33% by 2050s / 3 (18) 53% by 2080s	Periods of heavy and / or persistent rain	Pluvial flooding (flash floods from rainfall)	Closure of roads - disruption to delivery of services	Logistics/Infrastructure	
12	E.g 2aii					Customer/Citizen	
13	1	**Increasing summer temperatures** The projected changes are: *Increase* in **summer mean temperature** is: 0.4 (1.4) 2.5 °C by 2020s / 1.1 (2.5) 4.7°C by 2050s / 1.2 (3.5) 7.3°C by 2080s; *Increase* in **summer mean daily maximum** is: 0.5 (1.9) 3.5°C by 2020s / 1.1 (3.3) 6.6°C by 2050s / 1.2 (4.7) 10.3°C by 2080s; *Increase* in **summer mean daily minimum** is: 0.6 (1.5) 2.7°C by 2020s / 1.1 (2.7) 5.5°C by 2050s / 1.3 (3.8) 8.2°C by 2080s.	Higher summer temperatures				
		Increasing summer temperatures The projected changes are: *Increase* in **summer mean temperature** is: 0.4 (1.4) 2.5 °C by 2020s / 1.1 (2.5) 4.7°C by 2050s / 1.2 (3.5) 7.3°C by 2080s; *Increase* in **summer mean daily maximum** is: 0.5 (1.9) 3.5°C by 2020s / 1.1 (3.3) 6.6°C	Higher summer temperatures				

2a,b,c LSP Objective CRA | 2d Collation of LSP Obj. CRA | 4a,b,c LSP Organisation CRA | 4d Collation of LSP CRA | 5a Collation of EastMids CRA

Table O7: Copy of Template for Collation of CRA for Region continued

Step 5: Collation of Local Authority, LSP Objective & LSP Organisation Risk Assessment Forms																								
© East Midlands NI 188 Planning to Adapt Project 2009-2010																								
Name of Region:					Date of Collation:																			
PLEASE NOTE: You are REQUIRED TO USE THE RISK ASSESSMENT METHODOLOGY DOCUMENT during template completion																								
H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG
	LA 2020s Risk Number *12						LA 2050s Risk Number *12						LA 2080s Risk Number *12						Risk Number Grouping *16					Potential Adaptation Measures *14	
Ref. No. *1	Rutland CC	Leic City C	Leics CC	Derbyshire	Water Company	LSP Objectives	Rutland CC	Leic City C	Leics CC	Derbyshire	Water Company	LSP Objectives	Rutland CC	Leic City C	Leics CC	Derbyshire	Water Company	LSP Objectives	2020s	2050s	2080s	+ve or -ve *17	Control Measures or Safeguards currently in place *7	Observations and recommendations to reduce vulnerability *14	Cost* 14
Eg. 1ai					4						12						25		Regional	Sub-regional	Regional		Water Shortage Warnings; Repair leakages; Promotion of grey water usage in homes; Development of new collection network	Combine warnings with messages of water saving tips; Increase leakage repair; Installation of large-scale grey water recycling, especially in industry; Increase water storage facilities to capture heavier winter rainfall	
E.g 1aii						4						6						8	Regional	Regional County Councils Primarily	Regional		Noise Monitoring	Awareness campaign	
Eg. 1ai	9	12	8	6		8	16	16	15	12		12	20	25	20	16		20	Regional	Sub-regional	Regional		Clearance of road drains; Development Plans	Increase frequency of drainage clearing to once every 3 years; Ensure road development in low flood risk areas; Ensure road, housing and service development in low flood risk areas	
E.g 1aii	12					12	16					16	25					25	Regional	Regional County Councils Primarily	Regional		Clearance of road drains; Plan of alternative routes; River level monitoring system	Increase frequency of drainage clearing to once every 3 years; GPS systems updated to receive weather warning locations; Provide linkage of river level monitoring to GPS software to redirect	
1																									

2a,b,c LSP Objective CRA | 2d Collation of LSP Obj. CRA | 4a,b,c LSP Organisation CRA | 4d Collation of LSP CRA | 5a Collation of EastMids CRA

Table O7: Copy of Template for Collation of CRA for Region continued

	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE	BF
1	Step 5: Collation of Local Authority, LSP Objective & LSP Organisation Risk Assessment Forms																								
2	© East Midlands NI 188 Planning to Adapt Project 2009-2010																								
3		Name of Region:							Date of Collation:																
4	PLEASE NOTE: You are REQUIRED TO USE THE RISK ASSESSMENT METHODOLOGY DOCUMENT during template completion																								
5	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE	BF
6					LA 2020s Risk Number *12						LA 2050s Risk Number *12						LA 2080s Risk Number *12						Risk Number Grouping *16		
7	Ref. No. *1	Action required by whom *16	Date action by: *16	Date completed: *16	Rutland CC	Leic City C	Leics CC	Derbyshire	Water Company	LSP Objectives	Rutland CC	Leic City C	Leics CC	Derbyshire	Water Company	LSP Objectives	Rutland CC	Leic City C	Leics CC	Derbyshire	Water Company	LSP Objectives	2020s	2050s	2080s
8																									
9	Eg. 1ai	Water Company/ LA/Local Media; Water Company; Water Company/ Planning/Industry; Water Company/ Planning/Industry							No regret						No regret						No regret		Regional	Sub-regional	Regional
10	E.g 1aii	Police/Local Authority /Local Media								No regret						No regret						No regret	Regional	Regional County Councils Primarily	Regional
11	Eg. 1ai	Highways/Land-owners/Farmers; Planning			Low regret	Low regret	Low regret	Low regret	Low regret	Low regret	Win Win	Win Win	Win Win	Low regret	Low regret	Win Win	Win Win	Win Win	Win Win	Win Win	Win Win	Win Win	Regional	Sub-regional	Regional
12	E.g 1aii	Highways/Land-owners/Farmers; Emergency Services/Highways; Environment Agency/Emergency Services			Low regret	Low regret	Low regret	Low regret	Low regret	Low regret	Low regret	Low regret	Low regret	Low regret	Low regret	Low regret	Win Win	Win Win	Win Win	Win Win	Win Win	Win Win	Regional	Regional County Councils Primarily	Regional
13	1																								

2a,b,c LSP Objective CRA | 2d Collation of LSP Obj. CRA | 4a,b,c LSP Organisation CRA | 4d Collation of LSP CRA | 5a Collation of EastMids CRA

Annex P Guidance Notes for NI 188 Risk Assessment Template Usage

In order to ensure you are able to use the template correctly and to avoid unnecessary misuse, please find below additional guidance notes which are to be used in conjunction with the template key and instructions within the NI 188 Risk Assessment Template and the NI 188 Risk Assessment Methodology document.

Please Note: You will also need to follow additional guidance on the amendment, addition and removal of rows as described on the "Summary of Method" sheet under the "Amending, Removing and Adding Risks and/or Opportunities Protocol" and/or any other guidance given when you receive the template.

Protected & Editable Cells

1) Within the template a number of cells are protected, which you are unable to edit or format (e.g. cells highlighted by orange box in Figure P1). You are able to click onto all the cells which can be edited within the template. Please note: you are not able to format cells within the template.

Inserting & Deleting Rows

1) You are only able to insert and delete rows in the template where the row contains only unlocked (unprotected) cells, i.e. where you can click on every cell in the row (referred to as an "unlocked row").

2) To add in an additional row, you need to highlight one of the unlocked rows by clicking on the row number on the left-hand side of the Excel sheet. You can either insert a row above the highlighted row by using the Insert menu or by right clicking on the row number and using the right click menu. Please Note: When you insert a row in the template, the new row will include the formats from the row above. Therefore to ensure you are able to edit all cells and to be able to delete the row if required, please ensure you insert on the 3rd row (shown by purple arrow in Figure P1) within each impact section (example "impact section" indicated by red box in Figure P1) or below in order to insert a row which contains unlocked cells.

3) To delete a row from the template, you need to highlight the row and right click with the mouse to use the "delete" option from the right click menu. Please Note: You are only able to delete rows which only contain unlocked cells. Therefore you need to ensure when you insert a row that it is inserted under a row containing only unlocked cells, i.e. not the under the first row of each impact in the template (Figure P1). Therefore do not highlight the 2nd row (indicated by green arrow in Figure P1) to insert a row or the row inserted will contain locked cells and you will not be able to delete or sort the row if required.

4) Please Note: When you insert a row, the formulae are not copied from the row above. Therefore you will need to copy the formula Columns N – P in other rows into your new row in order for the risk score to be calculated.

Copying & Pasting into the Template

1) You are able to copy information from cells within the template and from external sources, and to paste this information into the cells which you are able to click on. This can be done using the Edit menu, right click mouse menu and by using the Control key commands (Ctrl+C to Copy; Ctrl+V to Paste).

2) To ensure information entered into the template is in the desired format, please ensure the information you copy and paste into the cells is in the desired format in the document you are copying from.

Sorting the Data

1) By following the above instructions for the insertion of rows, you will be able to sort the rows of data by any column using the Sort function under the Tool menu.

2) You are only able to sort rows which contain only unlocked cells. Therefore you are not able to sort the first row of each of the impact section.

3) If you are going to sort the rows, you will need to ensure all cells are completed in each row, i.e. ensure Columns A to S are filled in, even though this will mean the same information will be recorded in a number of cells in a Columns B - F, otherwise you will not be able to match the risk scores to the relevant future climate condition to who or what is effected category.

4) To sort the cells you need to highlight the group of rows you would like to sort and click on the Tools menu to click on the Sort function.

First Row of the Impact Sections (Blue arrow on Figure P1)

1) Due to the issues mentioned above, you may decide not to use the first row of the impact sections, as you are unable to sort these rows.

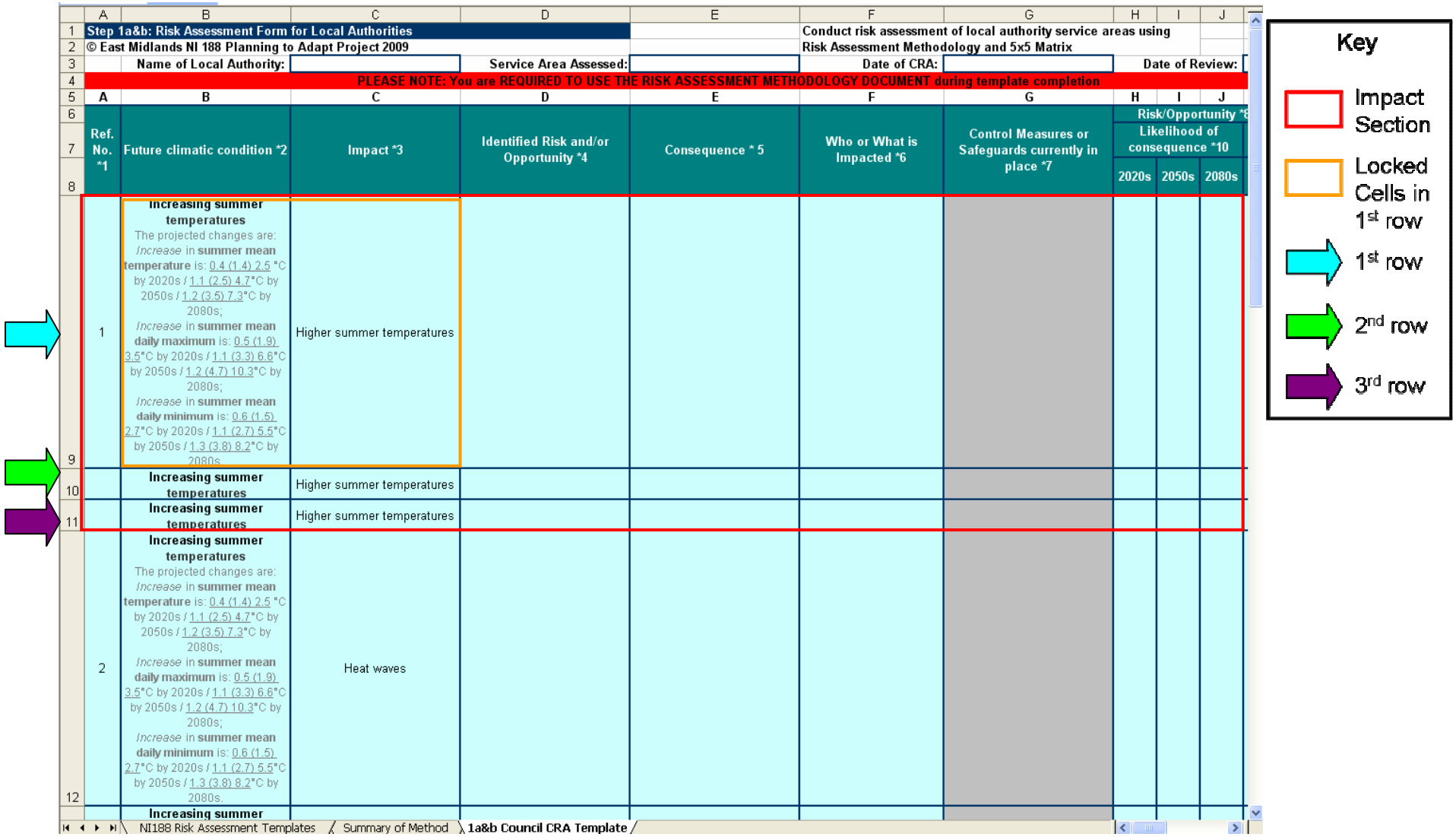


Figure P1: Impact section, locked cells in first row & rows in the NI 188 Risk Assessment Template **© East Midlands NI 188 Planning to Adapt Project 2009**

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Photography	**Unless otherwise referenced, all image are copyright of Microsoft Clipart**

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