

**AYRSHIRE JOINT STRUCTURE PLAN AND TRANSPORTATION COMMITTEE
7 JUNE 2002**

**UKCIP02's Climate Change Scenarios for the United Kingdom and The Scottish Executive
Central Research Unit Climate Change: Flooding Occurrences Review**

PURPOSE OF REPORT

- 1 To inform the Committee of the most recent research reports on climate change titled 'Climate Change Scenarios for the United Kingdom' (produced by the Hadley Centre, Tyndall Centre and University of East Anglia) and 'Climate Change: Flooding Occurrences Review' (Scottish Executive Central Research Unit).

BACKGROUND

- 2 The Committee will recall that since January 2000 there has been a series of papers presented on the findings of research documents based on the impacts of climate change. At each stage the Committee has commented on the lack of resolute data on which to support assumptions for an Ayrshire context. These two documents represent the most recent information and this paper will highlight the key findings of each document and how it informs the Structure Plan in its establishment of an information base for policy development.

KEY FINDINGS OF THE REPORTS

- 3 (a) Climate Change Scenarios for the UK

The document sets out four alternative future scenarios of climate change for three future time periods the 2020's, 2050's and 2080's. Although the findings of the UKCIP02 report in terms of temperature, seasonal variations and precipitation rates are broadly consistent with the previous findings. The main differences between the 1998 and the UKCIP02 report are as follows:-

- there are slightly larger warming rates across the UK;
- there is a higher atmospheric concentration of carbon dioxide than previously documented;

- there is likely to be smaller rates of sea-level rise than previously anticipated;
- Summers may become drier across the whole of the UK;
- Spring and Autumn may be drier than previously suggested by 1998 scenarios; and
- different patterns of change in average wind speed.

Overall the report does not show the full range of possibilities of climate change at a regional level but rather claims to provide 'greater detail and confidence levels' than the 1998 scenarios. A fuller depiction of the impacts of climate change for Scotland, including parts of Ayrshire, is the focus of the following document and although its research premise is based on the previous 1998 scenarios (and not the findings of UKCIP02 report) it does provide a more detailed picture for Scotland.

(b) Climate Change: Flooding Occurrences Review

The research findings have stated that flood risk, due to both river and coastal flooding, is expected to increase over the current century. The report examines the potential impact on a number of broad sectors and the key findings are as follows:-

Physical Impacts

- **Fluvial Flooding**
Historical records from the past five decades show there has been 'high variability in both frequency and severity of floods. Since 1989 new record peak flows have been produced on half of Scotland's largest rivers and this is considered to be due to storms coming off the Atlantic. This has meant an upward revision of risk estimates for flood levels of rivers in many parts of Scotland. Although it is not conclusive that these trends are directly related to climate change they show both a consistency of 'flood rich' periods from the past and future predictions that 'these floods and high flows could occur increasingly in the warmer and wetter Scotland under climate change scenarios. For example fluvial floods in 2080 could increase by up to 20%.
- **Coastal Flooding**
Parts of the Scottish coast have seen an increase in flood risk, which has been exacerbated by storm surge. It is stated that by 2050 'sea levels are predicted to rise by an additional 80-300mm which, when combined with future storm surges, could make most of Scotland's coasts below the 5 metre contour more vulnerable to flood risk. The impacts will also very greatly depending on whether the coastal areas is hard and rock or open beaches. In respect of surge levels, in 1991 a maximum level of up to +1.3m above the predicted tidal maximum was calculated for a surge event in southwest Scotland.

Economic Impacts

- The report presents an analysis of the number of properties at risk in Scotland from flooding. It is estimated that there are 93,000 coastal and 77,000 inland properties, which fall into this category (included in the report, as an area especially vulnerable to flooding is Kilmarnock). Current estimates of ‘annual damage from inland floods are around £20 million’. It is argued that this figure could rise by 115% by 2080 due to climate change.

In addition to the above properties around 6.7% of Scotland’s prime agricultural land is also vulnerable to flooding. However this is not broken down into a regional basis.

Given below is a table showing information from the report of the number of properties at risk within inland floodplain and coastal areas by local authority area.

Properties at Risk*	Area (Km²)	Total Nos. of Properties	Inland Flood¹ Plain	Coastal <5m²	Total
East Ayrshire	1,269	53,497	3,118	0	3,118
North Ayrshire	888	62,951	2,973	4,590	7,563
South Ayrshire	1,221	50,112	490	7,119	7,609
*No account is made for the flood protection or composition of property types e.g. Flats versus houses					

MAIN COMMENT ON THE DOCUMENTS

- 4 In broad terms the ‘new’ information takes on board previous comments from the Committee to the Scottish Executive for the need for more resolute data on the likely impacts of climate change. The UKCIP02’s report states that there is now more detail and confidence about the likely impacts of climate change scenarios whereas the Flood Occurrences Review shows not only the physical and economic impacts of flooding but also highlights that there will be social implications.

¹ Based on maps produced by SEPA

² based on assessment of areas below 5m contour

- 5 However for an Ayrshire context on which to develop Structure Plan policies for flooding there are still a number of outstanding matters as follows:-
- although the Flooding Occurrences Review shows the predictive trend of climate change, for example, vulnerable areas of flooding in Scotland such as Kilmarnock, in terms of risk of fluvial flooding these are only approximations. The report does not identify the extent of vulnerable inland areas with any certainty nor does it take into account existing flood defenses. However the call for improved research for a better understanding of the role of flood defence, developed models of rainfall run off, more precise topographic maps and indeed ‘better tools’ to manage flood and improve public awareness echo a repetition of comments previously made by the Committee;
 - the use of the ‘broad brush’ below 5-m contour model to analyse coastal areas is stated in the Flood Occurrences Report as being a ‘simplified assumption’. Indeed the Ayrshire Strategic Flood Appraisal Group are currently working with a more predictive pilot model for the Ayrshire coast developed by Strathclyde University which is based on GIS and digital data to assess the likely rise in sea level and makes possible predictions of areas at risk from flooding. This model can show not only the effects of climate changes scenarios at a strategic level over a 50 and 100 year period but also includes the impact of storm surge. Once an analysis and feasibility of the pilot is complete a full report will be presented to Committee; and
 - the EC Water Framework Directive (soon to be legislation) which will provide a context for water quality improvements and bring with it the potential for catchment management planning, although not dealt with in any detail in either report, adds another dimension to the flooding debate. In that flooding and water quality do not stand separately. For example following periods of high rainfall, which can wash polluting matter of fields or roads into the nearest watercourse, is one source of diffuse pollution³.

CONCLUSION

- 6 The research findings of both reports provide more information for the planning and flooding agenda, which is vital for planning procedures to cope with the consequences of climate change. However there is still scope for more resolute information in order to ‘quantify’ the scenarios at a local level as well as a need for conclusive measures for adaptations.

³ Scottish Executive Bathing Water Quality

RECOMMENDATION

7 The Committee note to the contents of this report.

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