

## PLANNING FOR FLOODING AND THE IMPACT OF CLIMATE CHANGE

- Weather events in Northern Ireland have provoked the question as to whether current planning and infrastructure arrangements are sufficient to provide defence against flooding.
- Information in this paper has been provided by the Met Office<sup>1</sup> and provides a detailed account of rainfall events of the past decade that have resulted in flooding. It provides an indication of the intensity and type of flood experienced.
- The information clearly demonstrates that flooding can occur as a result of varying types of weather event and is certainly exacerbated by human planning decisions. It begs the question: ***are current guidelines appropriate, and if not, do we change them now or play catch up later?***

### 1) Return Periods – A Common Misconception

- There is a common misconception in determining the relevance of return periods. Once a flood has been assigned a return period, for example a 100 year flood, it is often assumed that such a flood will not recur for another 100 years. **This is false.** Floods are random, and other factors being equal, have the same probability of occurring in any year.<sup>2</sup>
- The Met Office notes that “whilst the use of return periods are useful to put rainfall events into a *historical perspective*, with climate change playing an increasing role in the evolution of current and future weather patterns, the use of **return periods should not be used to predict the future likelihood of occurrence. Simply put, the past is no longer an adequate guide to the future**”<sup>3</sup>
- Current industry guidelines state that sewerage systems are designed to cope with a 1 in 30 year return period and roads are designed to cope with 1 in 100 year return period.
- The Foresight Future Flooding Project states that “the existing standards of protection for urban communities of between *1 and 50 years and 1 in 100 years could degrade to be between 1 in 15 years to 1 in 20 years over the next 50 to 80 years.*”<sup>4</sup>

<sup>1</sup> Met Office, *Significant rainfall events in Northern Ireland which have resulted in flooding in the last decade*, 6<sup>th</sup> October 2008.

<sup>2</sup> Rivers Agency, *National Flood Risk Assessment for Northern Ireland*, 2007, pg 4.

<sup>3</sup> Met Office, *Significant rainfall events in Northern Ireland which have resulted in flooding in the last decade*, 6<sup>th</sup> October 2008.

<sup>4</sup> Foresight, *Future Flooding Project*.

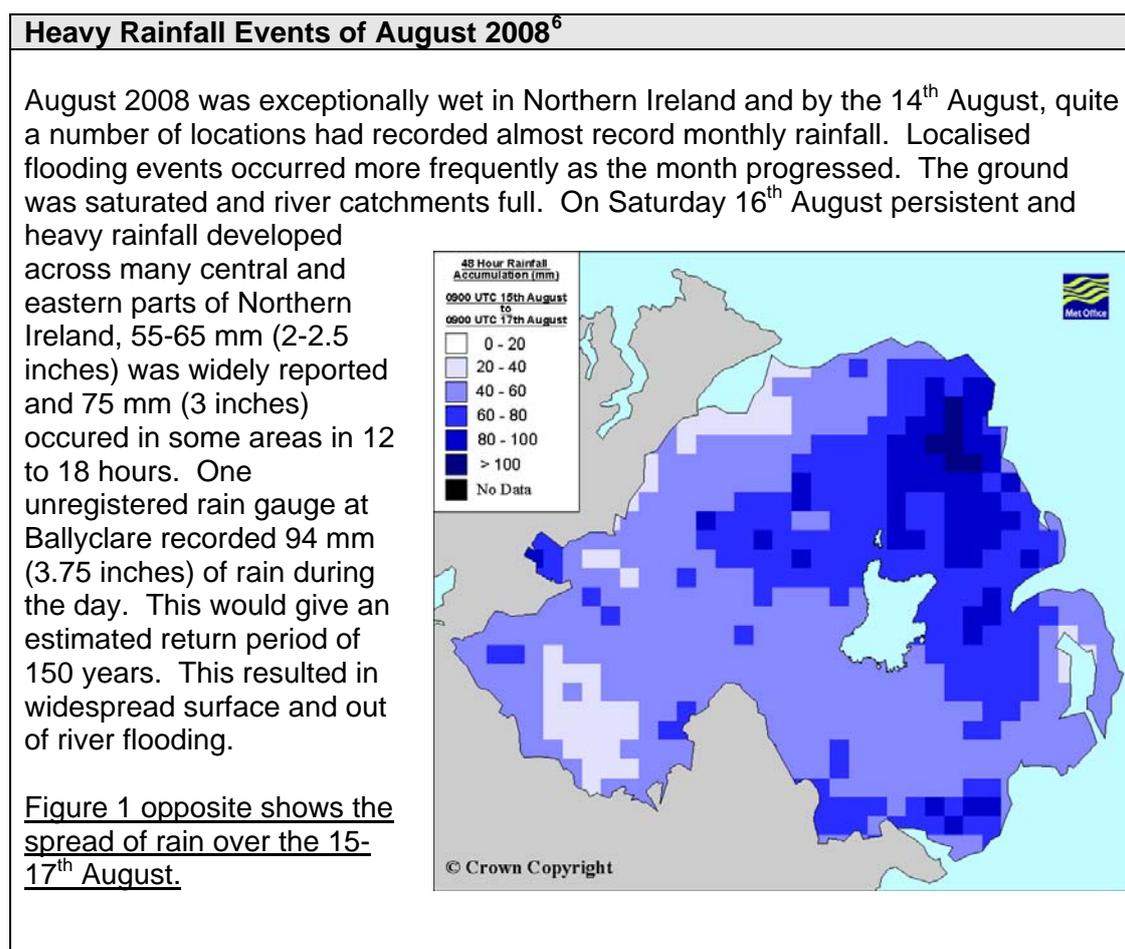
## 2) The Impact of Climate Change

- The impact of climate change has been extensively reported. The Met Office notes that the two main changes expected are:
  - i) **Increase in Winter Rainfall (October to March)**
  - ii) **Decrease in Summer Rainfall (April – September)**
- However, whilst summer rainfall is expected to decrease overall, the number of intense summer rainfall events is likely to increase due to a rise in summer temperatures. In other words, **a higher proportion of summer rainfall is expected to come from shorter, more intense, events.**<sup>5</sup>

## 3) Building on significant rainfall events of the last decade in N. Ireland

- Table 1 below provides an overview of some of the major flooding events experienced in N. Ireland over the past decade. This should be read in conjunction with Briefing Paper 1 which outlines the impacts of these events.

Table 1: Significant rainfall events of the last decade in Northern Ireland



<sup>5</sup> Met Office, Briefing Note of the 6<sup>th</sup> October 2008.

<sup>6</sup> *Ibid.*

#### **Prolonged frontal rain of 14 /15<sup>th</sup> June 2007<sup>7</sup>**

Just two days after the flash flooding of 12<sup>th</sup> June, a slow moving weather front brought 24 to 36 hours of persistent and often heavy rain to much of the east of Northern Ireland with County Down especially badly affected. 36 hour rainfall totals were widely between 50mm and 75mm (2-3 inches). With ground already saturated from the storms of the 12<sup>th</sup> and rivers running at an elevated level, the renewed rainfall resulted in surface and out of river flooding in numerous locations in Co-Down. Rainfall accumulations between 12<sup>th</sup> and 15<sup>th</sup> June were around 125mm (5 inches)<sup>8</sup> in some parts of Co. Down.

#### **Heavy, slow moving thunderstorms of 12<sup>th</sup> June 2007<sup>9</sup>**

Intense storms developed across central parts of Northern Ireland from late morning on 12 June 2007. The storms were slow moving and produced notable flash flooding on a scale which necessitated a significant multi-agency response.

The storms were again typical of summer rainfall events; intense and slow moving. In the Omagh area, severe flooding was reported and the rainfall recording site at Edenfel recorded 94.7 mm (4 inches) in the day, much of which is believed to have fallen between 1300 and 1600 on the afternoon of the 12<sup>th</sup> June. This would give an estimated return period of > 200 years and resulted in the highest daily rainfall total at the site since its record began in 1872 (though there are short gaps in the record).

In the east, severe flooding was reported in the south and east Belfast and at Belfast Ravenhill, a rainfall total of 50mm or 2 inches was recorded in 90 minutes between approximately 1300 and 1430. Homes and properties over a large area of south and east Belfast were inundated. A significant multi-agency response ensued.

#### **Heavy and Prolonged rainfall of the 1<sup>st</sup> December 2005<sup>10</sup>**

An active weather front moved east across Northern Ireland during the morning of the 1<sup>st</sup> December 2005. This gave several hours of heavy rain in parts of Armagh, Down and South and East Antrim. The worst of the rainfall affected the Belfast area and led to flooding in the Lower Ormeau area. Belfast Ravenhill recorded a daily value of 37.5mm (1.5 inches). The heaviest rainfall occurred between 0900 and 1200 when 25 to 30 mm (1.2 inches) fell in some parts of South Belfast. This would give an estimated return period of 20 years.

While very wet indeed, this type of rainfall is not uncommon and other factors appear to have played a part on this occasion. For example, rain had already fallen in the weeks prior to this event, the near-by river Lagan was higher than normal and a high tide coincided with the period of heaviest rainfall. Finally, critical infrastructure failed at a nearby pumping station resulting in a much reduced ability for the local drainage infrastructure to cope with the heavy rain.

<sup>7</sup> Met Office, Briefing Note of the 6<sup>th</sup> October 2008.

<sup>8</sup> *Ibid.*

<sup>9</sup> *Ibid.*

<sup>10</sup> *Ibid.*

**Heavy Thunderstorms and Localised Downpour which affected Derry City Centre on 17<sup>th</sup> August 2004.<sup>11</sup>**

August 2004 had an unsettled month with a number of heavy rainfall events affecting various parts of Northern Ireland. On 17<sup>th</sup> heavy storms developed in numerous areas, particularly from late morning onwards. A line of intense storms developed over Co. Tyrone during the day and became slow moving over the Derry City area during the later afternoon. It is estimated that approximately 30 mm (1.18 inches) of rain fell in the City Centre in 1 hour or slightly less. (Due to the uncertainty in the exact value and duration, it is not sensible to calculate a return period for this event). This overwhelmed the drainage system and resulted in widespread flooding. This is another example of a highly localised summer downpour.

**Heavy and Localised downpour which affected Belfast City Centre on 28<sup>th</sup> July 2000.<sup>12</sup>**

A trough of low pressure moved slowly West to East across Northern Ireland during the course of the day on the 28<sup>th</sup> July 2000. Heavy showers and thunderstorms developed in the east from late morning but by far the most intense of these storms affected the Greater Belfast area between 1430 and 1600. In central Belfast, 58 mm (2.3 inches) fell in just 90 minutes. This would give an estimated return period of > 200 years. This was an example of a highly localised, slow moving and intense rainfall event in what was otherwise a dry summer month overall in the Belfast area.

- In addition to the major events outlined above, the Met Office has provided details of other daily rainfall events that could have resulted in Flooding in Northern Ireland. A cursory search of media releases from these dates demonstrates the extent of disruption caused. See Table 2 below.

Table 2: Other localised flooding events

Date	Daily Rainfall(mm)	Event	Reference
20/10/2002	36.2	Flooding Reported in region. South Down worst hit.	Belfast Telegraph (22/10/08)
25/10/2006	34.8	Localised flooding in Belfast.	BT (26/10/05)
07/01/2005	34.4	Storms in region cause flooding.	Irish News (1/08/05)
16/08/2008	33.5	Widespread Flooding in Northern Ireland.	BT (17/08/02)
23/10/2005	32.0	Storms result in localised flooding.	BT (24/10/05)
11/03/2006	29.3	No reference to flooding.	-
20/09/2006	28.6	Localised flooding.	BT 22/9/06)
17/04/2002	28.3	No reference.	-
07/12/2000	27.6	Flash Floods Create Chaos in province.	BT (8/12/00)
11/08/2008	27.1	Led to widespread flooding.	BT (12/08/08)
28/02/2003	25.6	No reference.	-
30/01/2004	25.5	No reference.	-

<sup>11</sup> *Ibid.*

<sup>12</sup> *Ibid.*

22/06/2004	24.8	No reference.	-
12/06/2007	23.6	Led to widespread flooding in the East.	BT (13/06/07)
20/01/2008	23.2	Localised Flooding	BT 21/01/08

6<sup>th</sup> November 2008