



A Preliminary Assessment of the Flooding which occurred on 24 October 2011 in Selected Catchments on the East Coast, based on data collected at the EPA-LA Hydrometric Stations

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Rainfall

A spell of very heavy rainfall on 24 October 2011 mainly affected Eastern and Northern parts of Ireland. Initial analysis of the available measurements results in the following comments: although significant amounts affected many areas, the greater Dublin Area received by far the most rainfall. A report on the rainfall that caused this flooding event (written by Liam Keegan of Met Éireann), is included in Appendix 1 of this report.

Runoff

This report contains a preliminary comment on the runoff in the storm which was recorded at the EPA-LA Hydrometric stations on the East coast of Ireland.

Activity of the EPA Dublin Regional Hydrometric Team on 24 October 2011

Following reports of expected flooding on Monday 24 October 2011, the Dublin Regional Hydrometric Team, Michael Stapleton and Michael Browne, EPA, checked selected data loggers in the local authority network their region which they anticipated would be affected by the forecast heavy rainfall that evening.

Results of our findings:

1. The peak level and flow in the River Dodder at Station 09010 Waldron's Br. in the October 2011 flood were not as severe as the peak levels and flows that occurred in the same river as a result of the effects of Hurricane Charlie (August 1986). The peak flow estimated to have occurred at Station 09010 Waldron's Bridge in the October 2011 flood is estimated at 213 m³/s. This can be compared to the peak flow which is estimated to have occurred in the flood resulting from Hurricane Charlie (August 1986) of 270 m³/s.
2. The peak level and flow in the River Slang at Station 09011 Frankfort in the October 2011 flood were higher than the peak levels and flows that resulted from the effects of Hurricane Charlie (August 1986); However this comment must be qualified by the fact that (1) the peak of the hydrograph in the October 2011 flood was not fully recorded and (2) the recorder was affected by backwatering from the bridge downstream of the station.
3. The peak level in the Owendoher River at Station 09009 Willbrook Road in the October 2011 flood were more severe than the peak level that occurred at this station resulting from the effects of Hurricane Charlie (August 1986). The rating

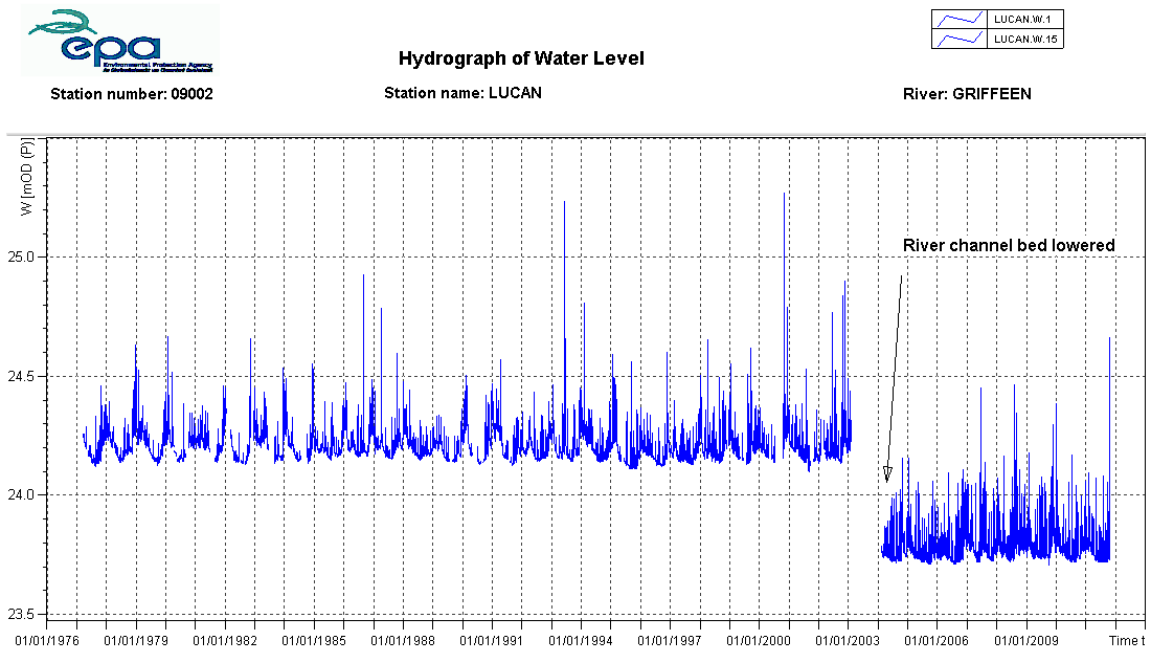
curve at this station needs to be further developed at the higher flow end to allow extrapolation of the rating curve

4. The flooding events recorded at the two stations, 10002 Rathdrum on the Avonmore River and 10028 Knocknamohill on the Aughrim River (both subcatchments of the Avoca Catchment) indicate that the flooding in that catchment was not as severe as the flooding that occurred in the Avoca Catchment as a result of the Hurricane Charlie flood.

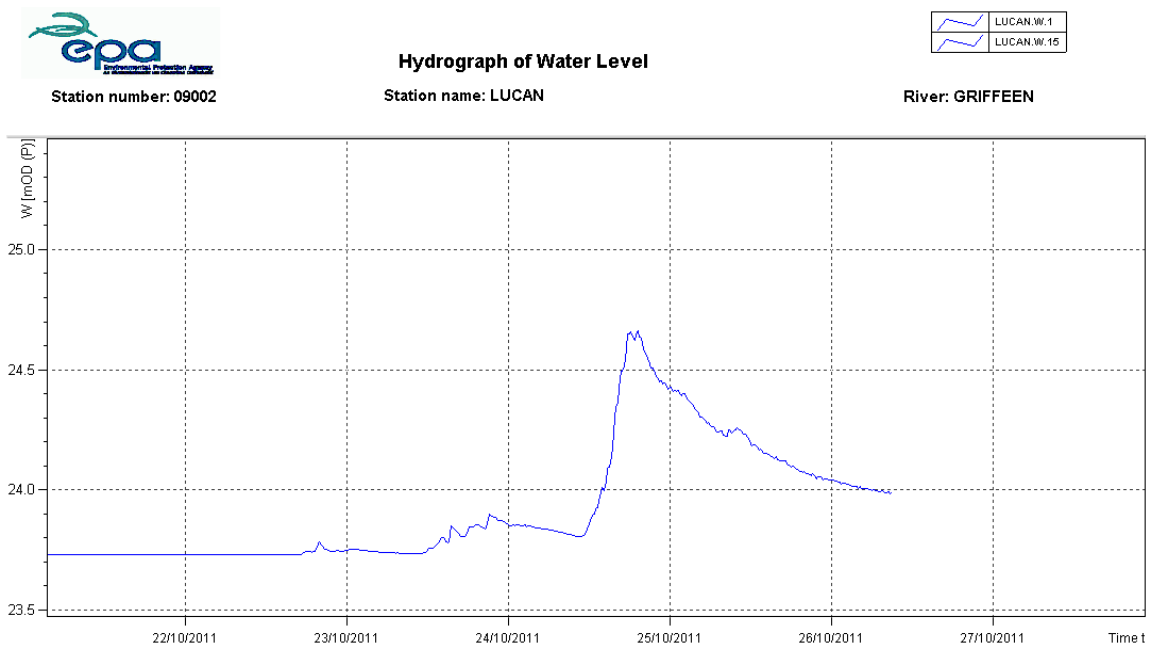
The results of the flooding at selected hydrometric stations are presented in the following pages, in hydrometric station number order. The data is presented in the form of (1) the complete instantaneous hydrograph of water level and (2) the hydrograph for the flood of 24 October 2011.

The hydrometric stations are numbered in accordance with the numbering contained in the Register of Hydrometric Gauging Stations in Ireland.

Hydrograph of Water Level for the period of Record at Station 09002 Lucan on the River Griffeen



Hydrograph of Water Level at Station 09002 Lucan on the Griffeen River for the Flood of 24-25 October 2011.

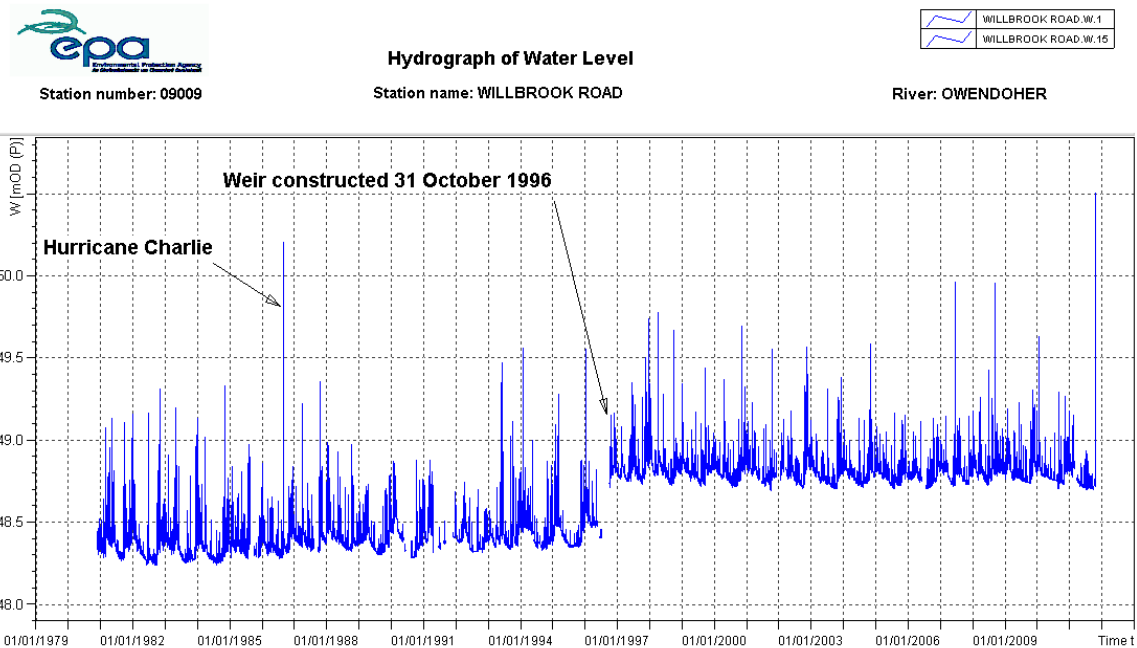


Description of the Flood of 24 October 2011 at Station 09002 Lucan on the River Griffeen

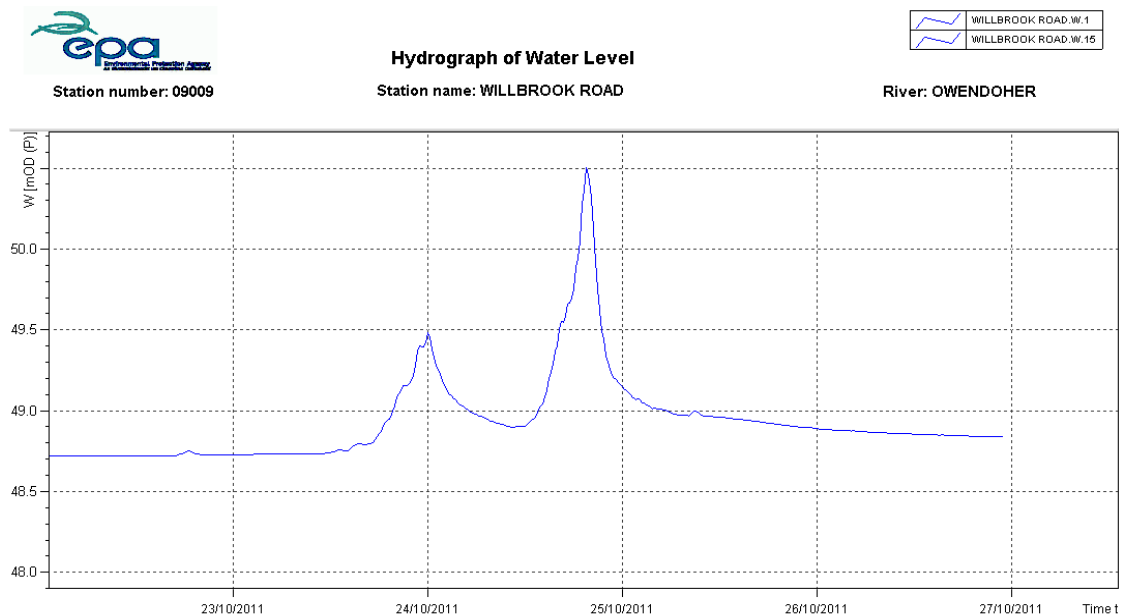
At 11:15 on 24th October 2011 the water level started to rise. The water level rose steadily to a level of 24.66 m OD (Poolbeg) (1.1 m on the SG) at 17:45 hrs. It stayed around this level till 19:15 hrs before water levels started to fall.

At present the EPA is developing the Rating Curve for this station and is unable to give accurate flows for the maximum level recorded in this flood of October 2011 at this time.

Hydrograph of Water Level for the period of Record at Station 09009 Willbrook Road on the River Owendoher



Hydrograph of Water Level at Station 09009 Willbrook Road on the Owendoher River for the Flood of 24-25 October 2011.

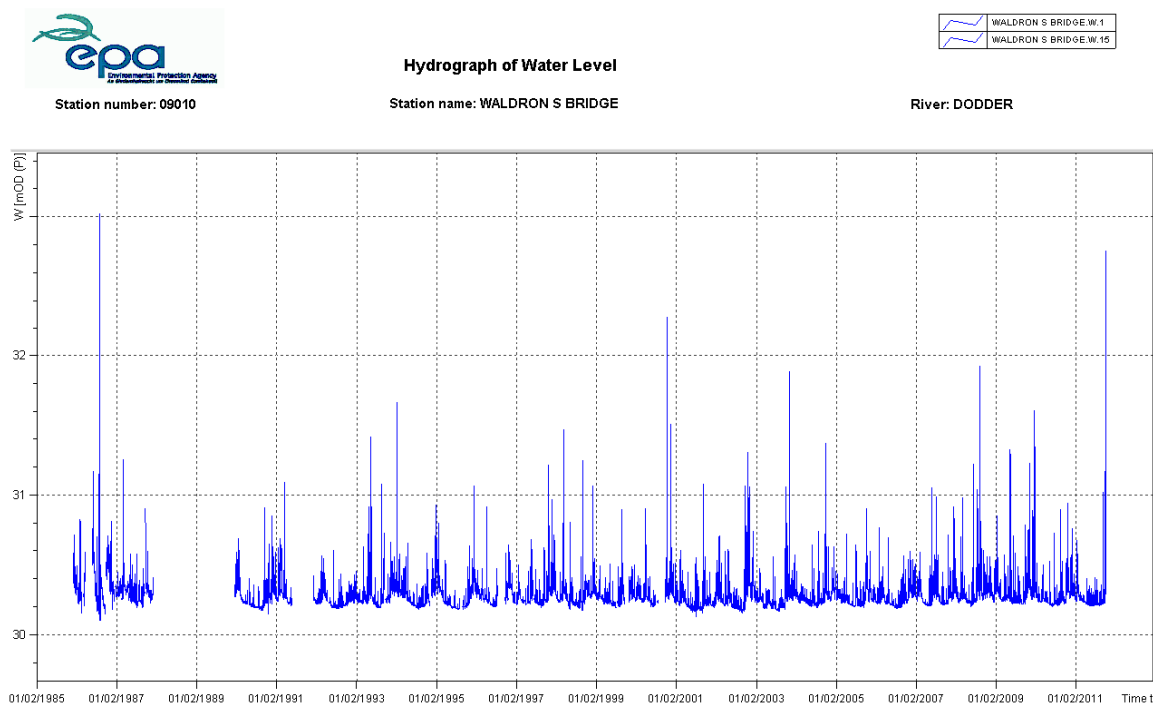


Description of the Flood of 24 October 2011 at Station 09009 Willbrook Road on the River Owendoher

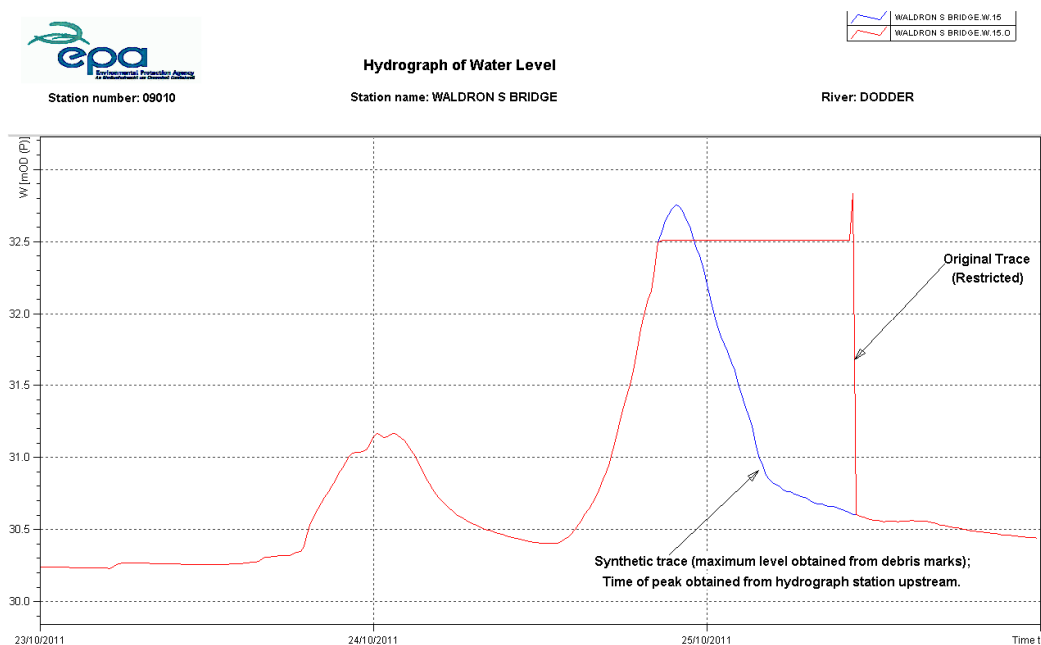
At 12:00 hrs on 24th October 2011, the water level started to rise. The water level rose steadily to a level of 50.50 m OD (Poolbeg) (1.91 m S/G) at 19:30, when it started to fall very sharply.

At present the EPA is developing the Rating Curve at this station and are unable to give accurate flows for the maximum level recorded at this time.

Hydrograph of Water Level for the period of Record at Station 09010 Waldron's Br. on the River Dodder



Hydrograph of Water Level at Station 09010 Waldron's Br. on the River Dodder for the Flood of 24-25 October 2011.



Description of the Flood of 24 October 2011 at Station 09010 Waldron's Br. on the River Dodder

At 13:30 hrs on 24 October 2011, the water level started to rise. The water level rose steadily to a level of 32.76 m OD (Poolbeg) (2.65 m the SG) at 21:45 hrs, when it started to fall. The flow rate corresponding to this level of 2.65 m on the SG is estimated at 213 m³/s. (the peak flow estimated to have occurred in the flood caused by Hurricane Charlie is around 270 m³/s.

Important note

The cables on the data logger malfunctioned from 20:45 hrs on 24 October 2011 at a level of 32.51 m OD (2.41m on the SG) to 09:45hrs on 25 October 2011 at a level of 30.6 m OD (0.5 m on the SG). The missing trace was edited using debris marks in the recorder house to estimate the peak level, and information and data from neighbouring data loggers to estimate the time of the peak level.

Hydrograph of Water Level for the period of Record at Station 09011 Frankfort on the River Slang





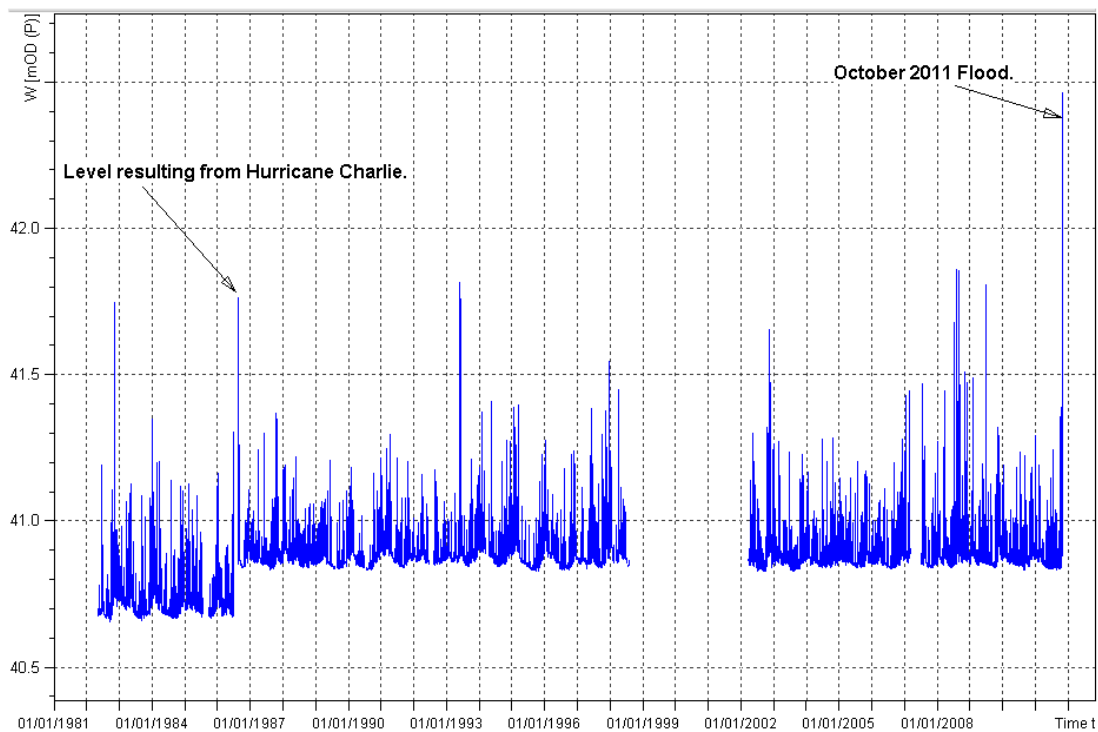
Station number: 09011

Hydrograph of Water Level

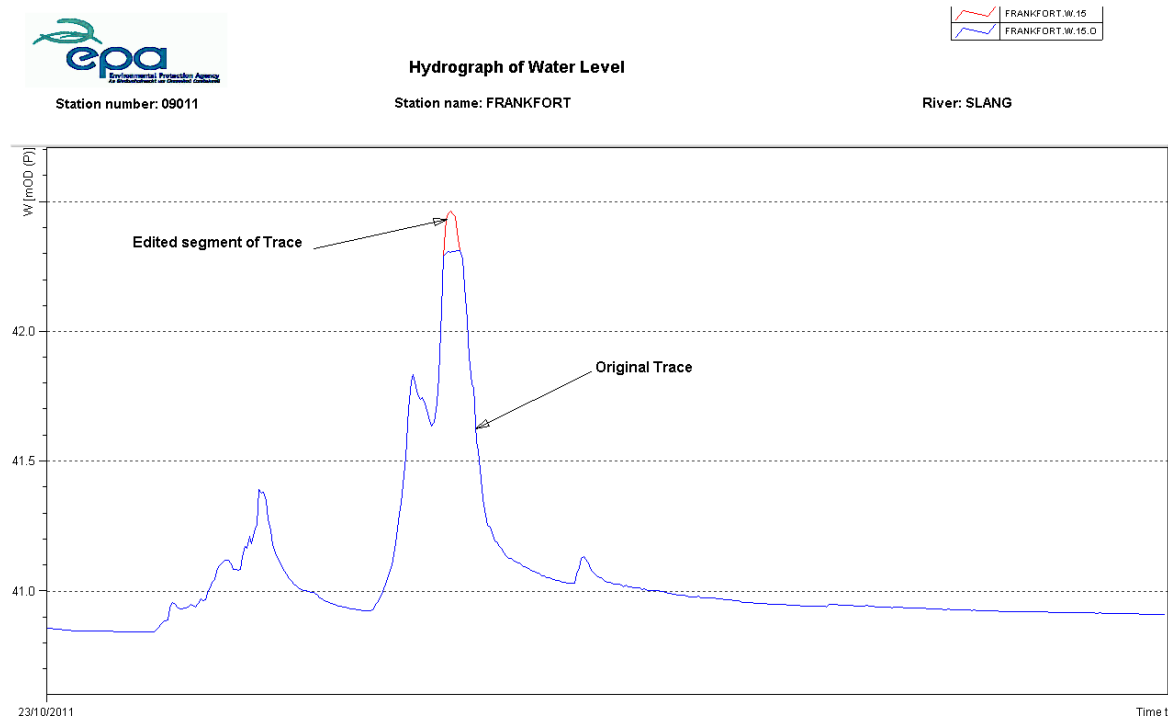
Station name: FRANKFORT

River: SLANG

| | |
|---|----------------|
|  | FRANKFORT.W.1 |
|  | FRANKFORT.W.15 |



Hydrograph of Water Level at Station 09011 Frankfort on the Slang River for the Flood of 24-25 October 2011.



Description of the Flood of 24 October 2011 at at Station 09011 Frankfort on the Slang River

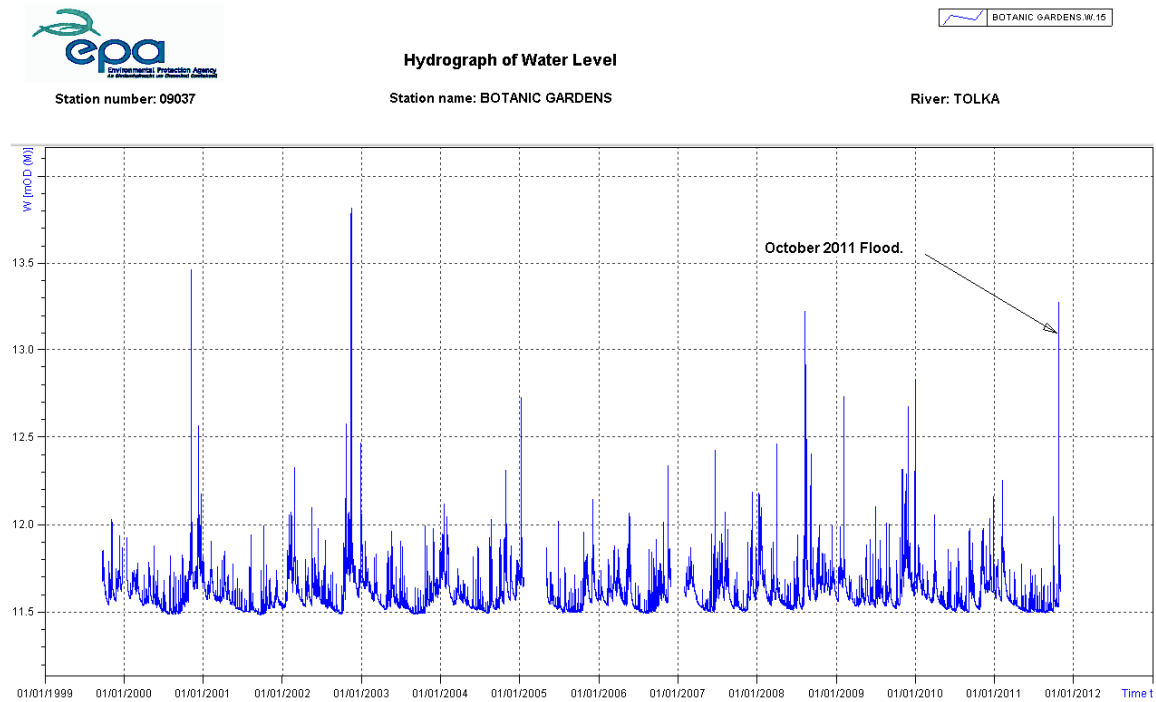
At 11:00 on 24th October 2011 the water level started to rise. The water level rose steadily to a level of 42.46 m OD (Poolbeg) (1.96 m the SG) at 19:15 hrs, when it started to fall very sharply.

At present we are developing the Rating Curve at this station and are unable to give accurate flows for the maximum level recorded at this time.

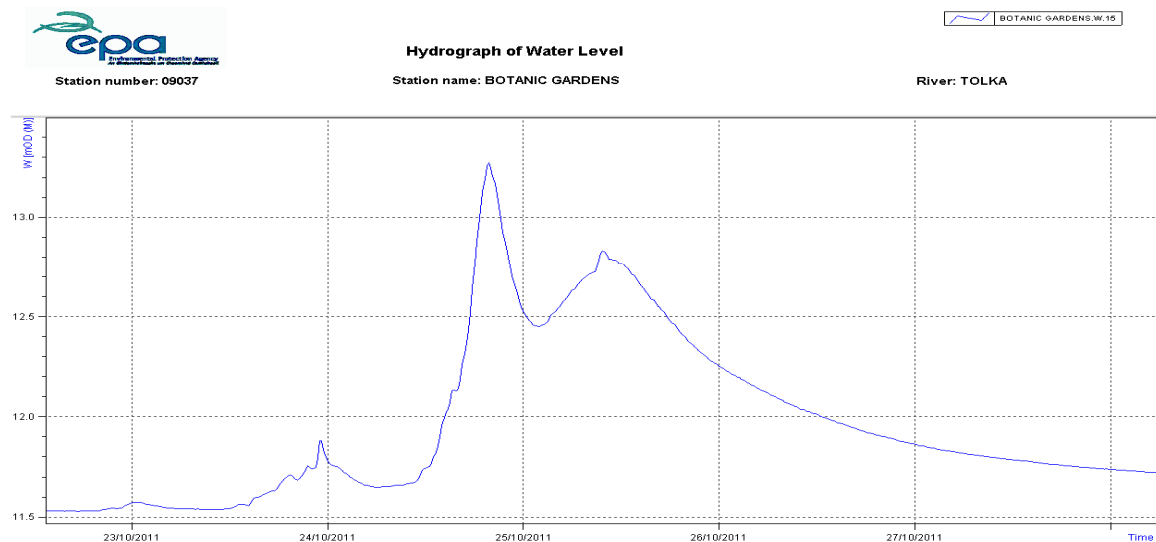
Important note

1. The construction of a channel control was completed at this station on 14 August 1986 (i.e. before the Hurricane Charlie Flood which occurred on 26 August 1986).
2. The data logger was topped from 18:30 hrs to 20:15 hrs on 24 October 2011 at a level of 42.3 mOD (Poolbeg). The missing trace was edited using debris information. Also the maximum WL level, obtained from the debris marks at this station, is above the soffit level of the bridge downstream of the station.

Hydrograph of Water Level at Station 09037 Botanic Gardens on the River Tolka for the Period of Record



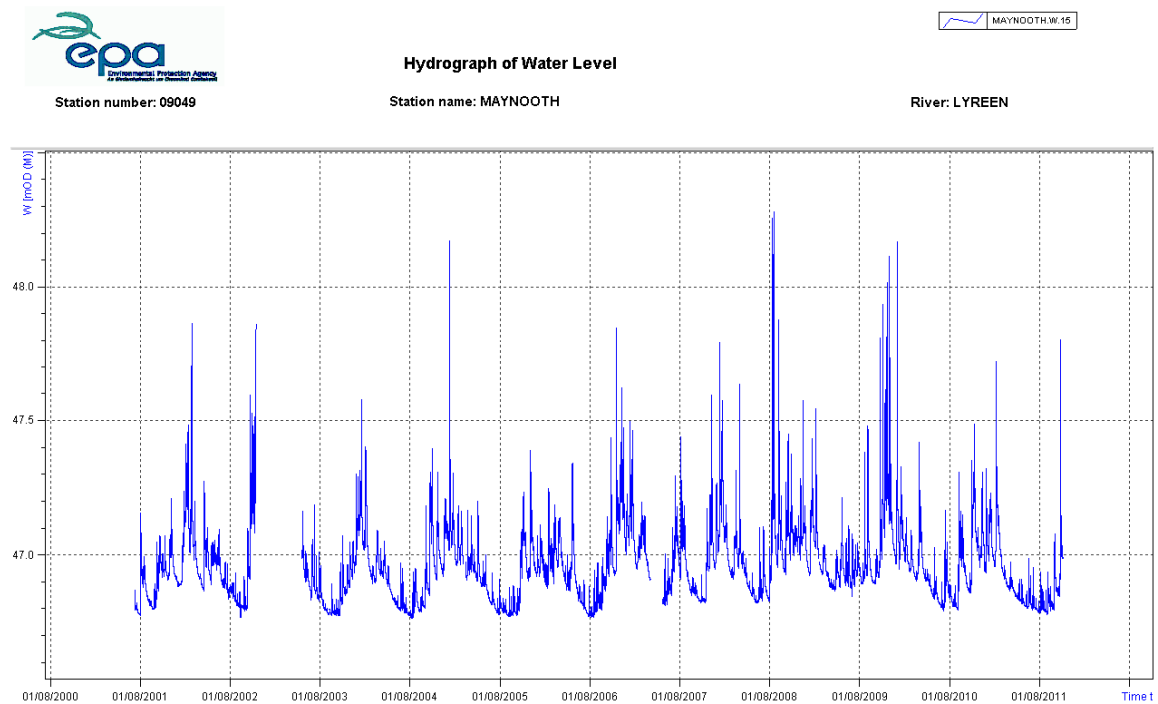
Hydrograph of Water Level at Station 09037 Botanic Gardens on the River Tolka for the Period 23-25 October 2011



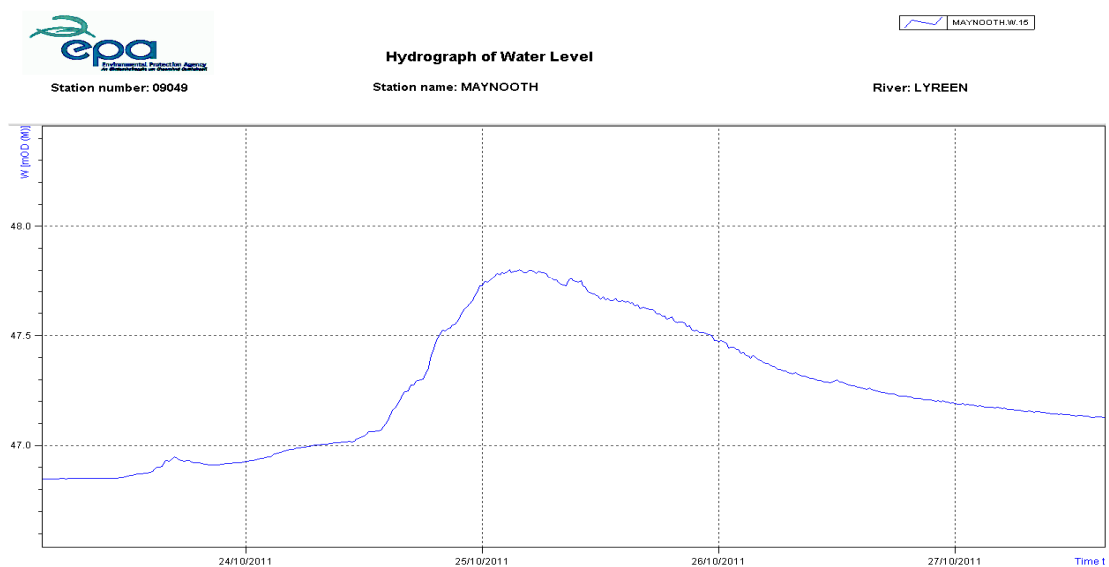
Description of the Flood of 24 October 2011 at at Station 09037 Botanic Gardens on the River Tolka

At 11:00 on 24th October 2011, the water level at Station 09037 Botanic Gardens started to rise. The water level rose steadily to a level of 13.28 m O.D. (Malin) (1.88 m on the SG) at 19:45 hrs on 24th October, when it started to fall to a level of 12.45 m O.D. (Malin) (1.06 m on the SG) at 2:00 hrs on 25th October, before rising again to a level of 12.83 m O.D. (Malin) (1.44 m on the SG) at 9:45 hrs on 25/10/2011, when it started to fall again. The flow rate corresponding to this level of 1.88m on the SG is 66 m³/s.

Hydrograph of Water Level for the period of Record at Station 09049 Maynooth on the Lyreen River



Hydrograph of Water Level at Station 09049 Maynooth on the Lyreen River for the Flood of 24-25 October 2011.

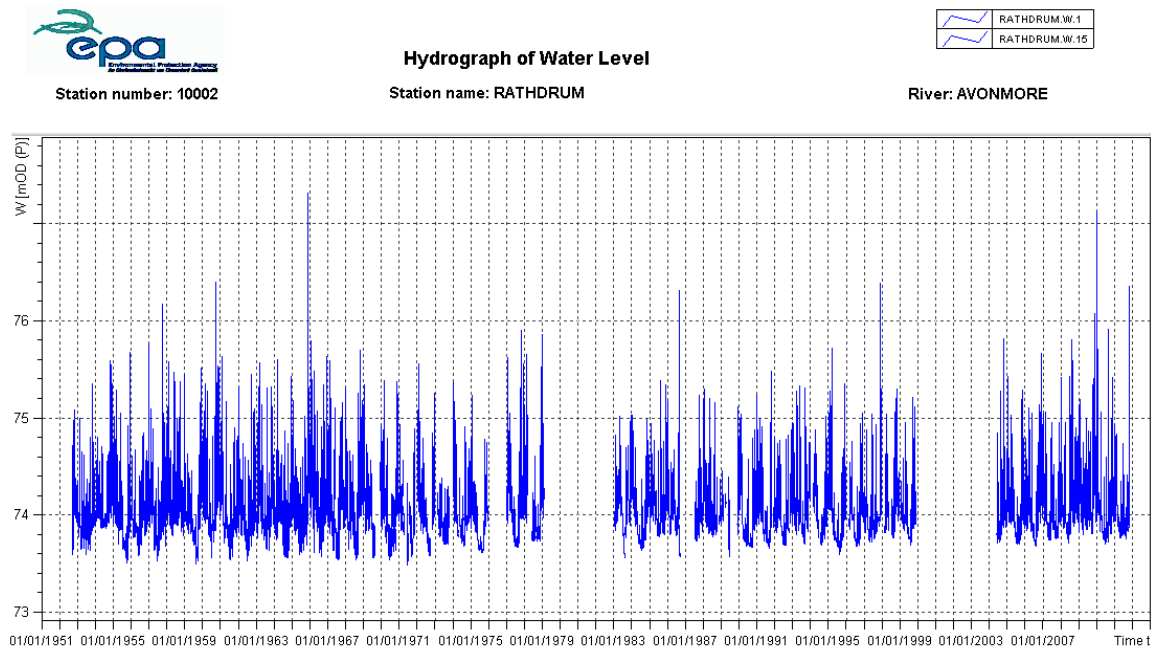


Description of the Flood of 24 October 2011 at at Station 09049 Maynooth on the Lyreen River

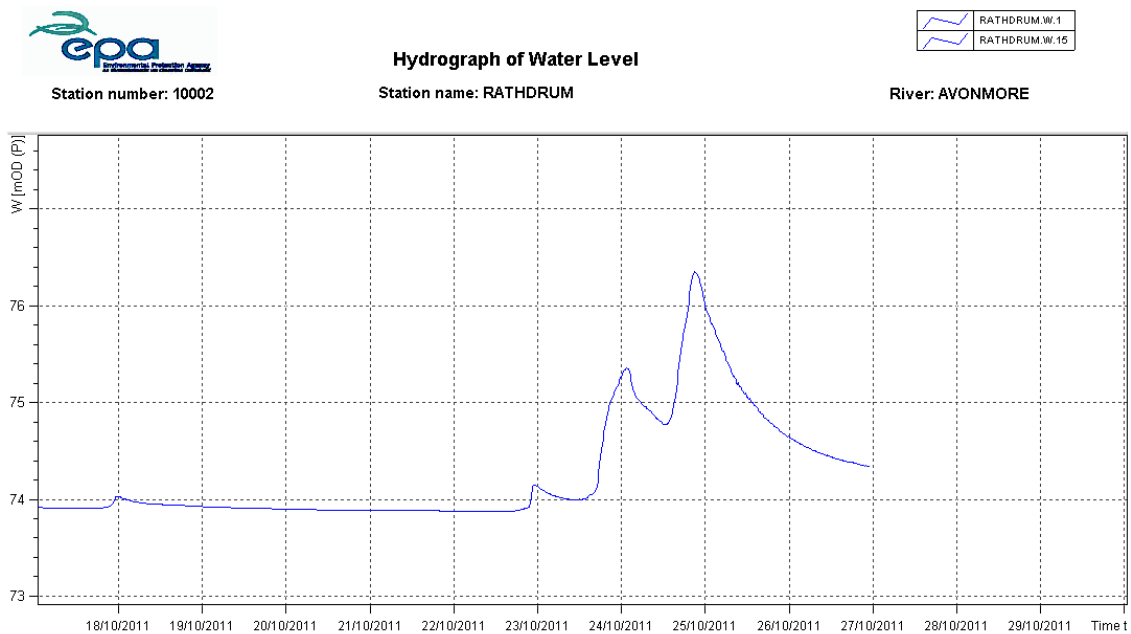
The flood on October 2011 was not significant at Station 09049 Maynooth in comparison to other floods recorded at this station in the past. (See Hydrograph showing the hydrograph for the period of record at this station)

At present we are developing the Rating Curve at this station and at present are unable to give accurate flows for the maximum level recorded in this flood.

Hydrograph of Water Level at Station 10002 Rathdrum on the River Avonmore for the Period of Record



Hydrograph of Water Level at Station 10002 Rathdrum on the Avonmore River for the Period 23-25 October 2011

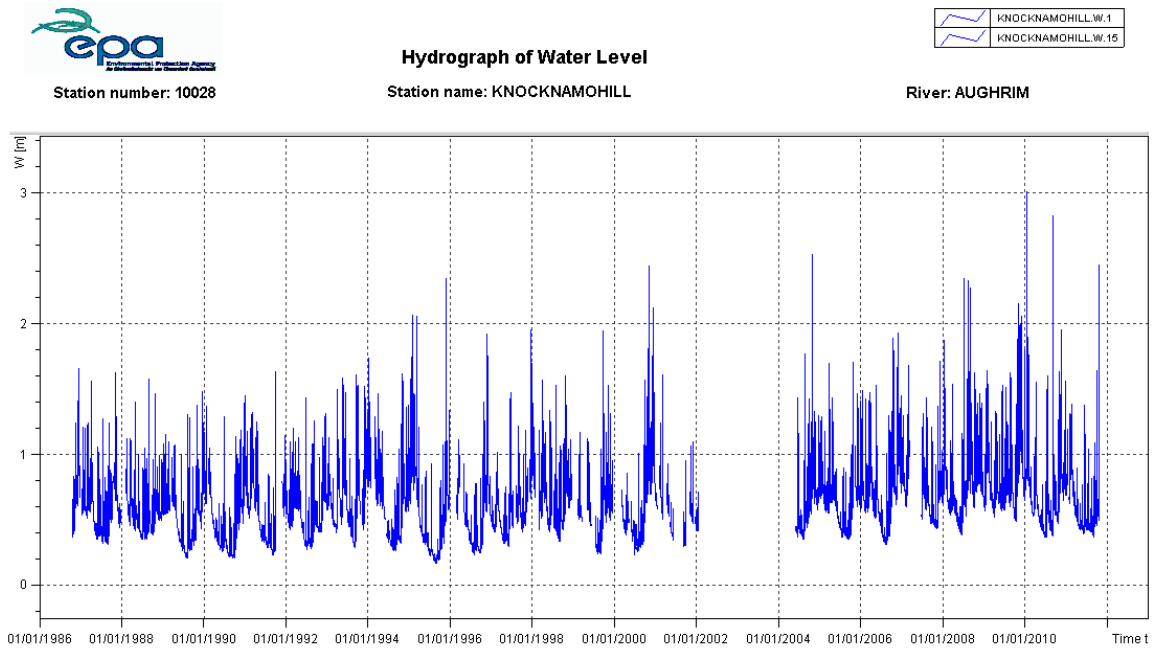


Description of the Flood of 25 October 2011 at at Station 10002 Rathdrum on the Avonmore River

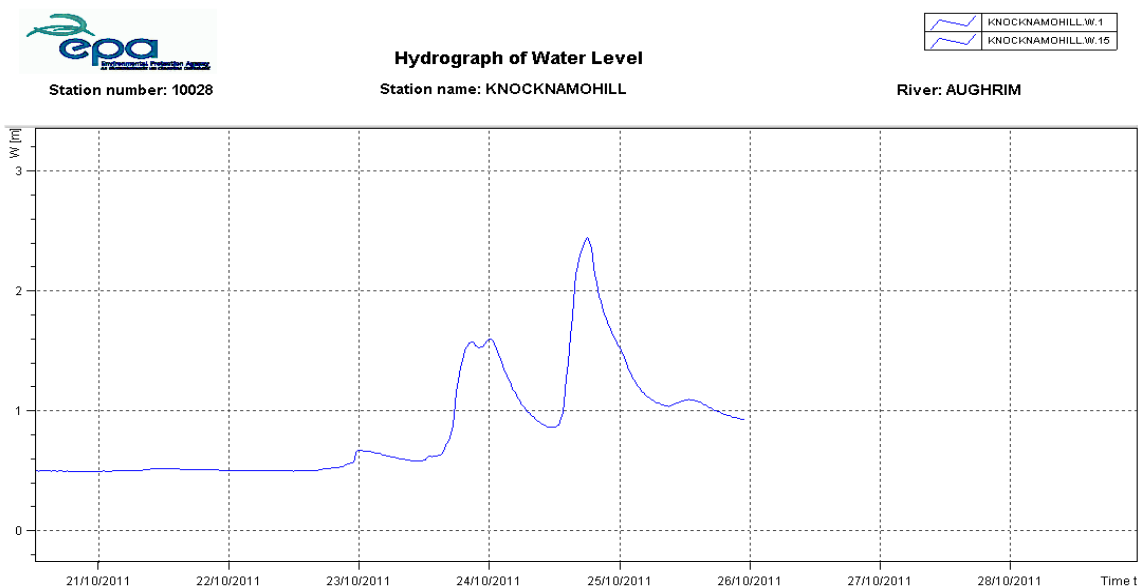
The flood on 25 October 2011 was not significant at Station 10002 Rathdrum in comparison to other floods recorded in the past. (See Hydrograph showing the water levels in the period of record for this station).

At present, we are developing the Rating Curve at this station and at this time, are unable to give accurate flows for the maximum level recorded in this flood.

Hydrograph of Water Level at Station 10028 Knocknamohill on the Aughrim River for the Period of Record



Hydrograph of Water Level at Station 10028 Knocknamohill on the Aughrim River for the Period 23-25 October 2011



Description of the Flood of 25 October 2011 at at Station 10028 Knocknamohill on the Aughrim River

The flood of 25 October 2011 was not significant at Station 10028 Knocknamohill in comparison to other floods recorded at this station in the past. (See Hydrograph for the period of record at this station)

At present we are developing the Rating Curve at this station and are unable to give accurate flows for the maximum level recorded in this flood at this time.

Appendix 1.

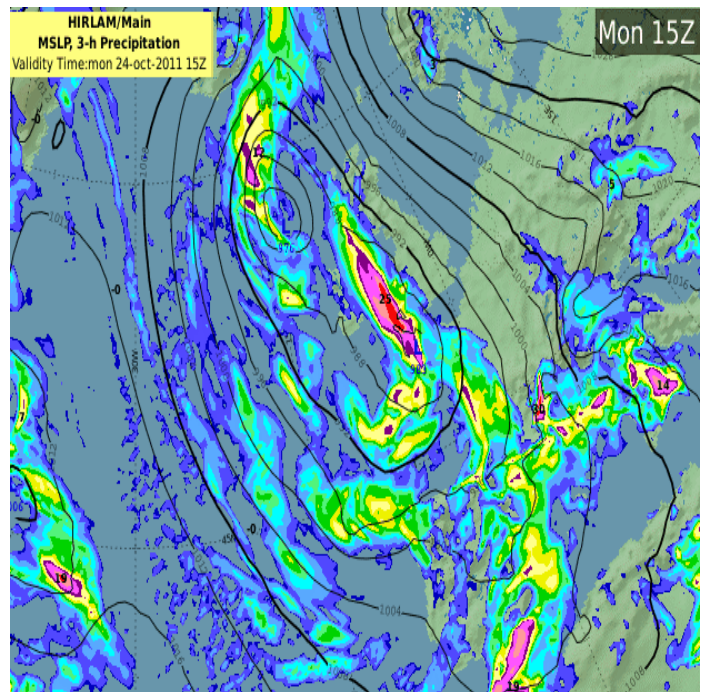
A Report received from Met Éireann dealing
with the flood of 25 October 2011

Heavy Rainfall of 24th October 2011 in the greater Dublin Area.

Ireland was at the centre of a slow-moving frontal depression which stretched from western France to south of Iceland. The Wicklow Mountains caused a process called orographic uplift when moist air is forced to rise by a mountain barrier, condenses and then falls as rain. In addition there was coastal convergence, the convergence of isobars off the east coast also caused moist air to rise and fall as rain. This conspired to produce excessive rainfall in the Dublin area.

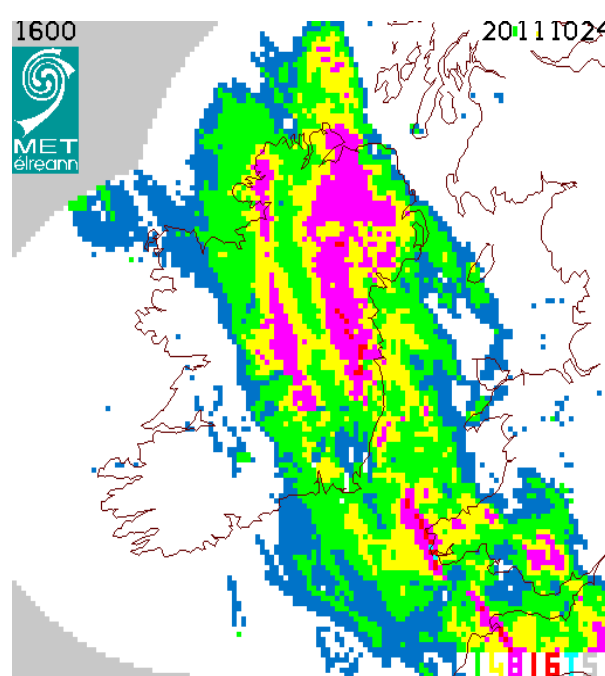
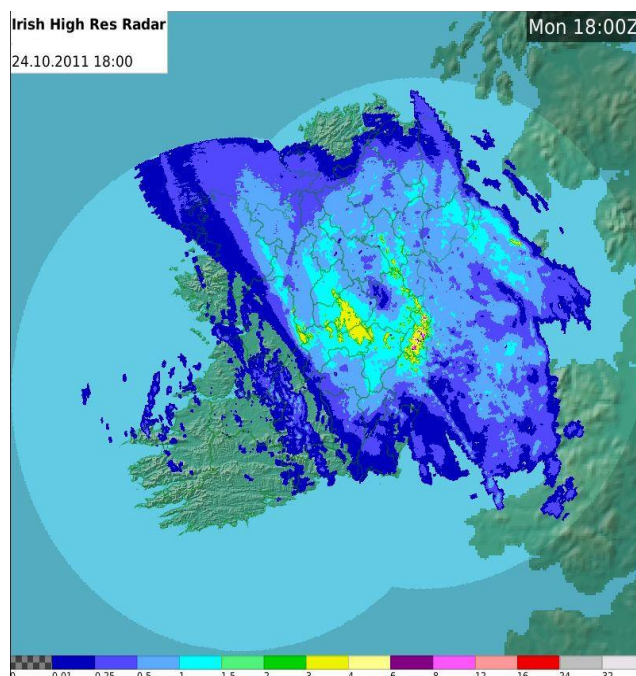
A spell of very heavy rainfall affected mainly Eastern and Northern parts of Ireland. Initial analysis of the available measurements results in the following comments. Although significant amounts affected many areas, the greater Dublin Area received by far the most rainfall. Our station at Casement Aerodrome set a new record of 82.2mm for the greatest daily total for the month of October, since rainfall records began there in 1954. The greatest daily total for any month of the year was 108.6mm which fell on 11th June 1993.

The majority of the rainfall occurred during the period from 2 pm to 8 pm with 65.7mm falling in the 4 hours between 3 pm and 7 pm. This 4-hour fall is approximately a 1 in 80 year event. The 23.0mm of rainfall which fell between 4 pm and 5 pm made this the wettest hour on record at Casement Aerodrome.



Radar image at 7 pm (1800utc)

Radar image at 5 pm (1600 UTC)



The stations at Dublin Airport and the Phoenix Park also had significant daily rainfall totals of 69.1mm and 71.3mm respectively. In terms of annual exceedence probability, the daily totals at the Dublin stations would represent approximately 1 in 20 to 1 in 25 year events.

The table below summarises the most significant figures.

| Station | Daily Rainfall total | Return Period | Max. 4-hour Rainfall | Return Period |
|--------------------|----------------------|---------------|----------------------|---------------|
| Casement Aerodrome | 82.2 mm | 20 years | 65.7 mm | 80 years |
| Phoenix Park | 71.3 mm | 20 years | 48.2 mm | 45 years |
| Dublin Airport | 69.1 mm | 25 years | 42.9 mm | 40 years |

Radar image at 5 pm (1600 UTC)

Putting these events in historical context:

- Over 180mm was recorded on 11th June 1963 during a violent thunderstorm in the Mount Merrion area of South Dublin.
- 11th June 1993, exactly 30 years later, saw amounts of rain of around 100mm over 24 hours in the Dublin area.

- 29th June 2005 saw 45mm fall in the Phoenix Park in less than an hour.
- 9th August 2008 saw heavy rainfall, particularly affecting the North Kildare and Dublin area with amounts in excess of 70mm measured in the Celbridge, Lucan, Leixlip area.

Liam Keegan
Met Éireann
October 2011