

### Background

During October & November 2009 Enniskillen, County Fermanagh experienced unprecedented levels of rainfall.

Extensive flooding took place throughout the area and Upper Lough Erne rose to an unexpected volume due to a 1 in 100 years level of rainfall. Following this event the Northern Ireland Executive instigated a cross departmental flooding taskforce to investigate the causes and put in place measures to mitigate against future flooding.

Killyhelvin Water Treatment Works (WTW), located just outside Enniskillen on the shores of Lough Erne produces drinking water for the majority of the Enniskillen area.

The WTW was constructed on the site of a previous WTW facility, above the water levels expected in the managed lough system. This site has potable water storage tanks and substantial underground construction and water storage. Due to power requirements of the works it also has a major electrical substation located in the basement of the works.

The protracted period of wet weather causing the increased level of Lough Erne threatened to flood the WTW, contaminate the potable water supplies and disable the electrical substation. This was only prevented by extensive sandbagging, emergency pumping, sealing of ducts and electrical work.



### Key Points

County Fermanagh experienced 337mm of rainfall in 42 days which was a record level. This caused levels in the Lough Erne system to rise reaching an all time high since it was modified with a new control weir in 1956 and placed Killyhelvin WTW in danger of flooding.

NI Water reviewed the impact of this event on the Killyhelvin site and the potential for additional damage had the levels increased further. As a result resilience works to reduce the risk of flooding in the future were designed and implemented at a cost of £600k. This work was completed in January 2012.

## Project Aim

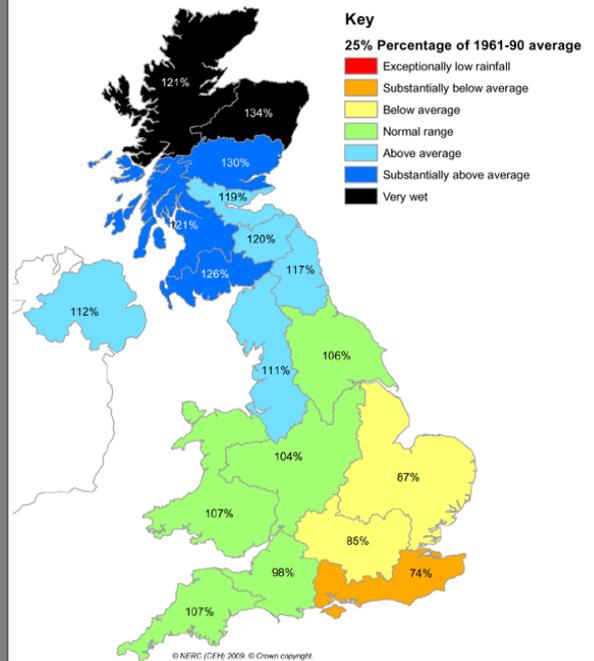
The aim of the review was to investigate the causes of the flooding, identify lessons learned and consider measures required to mitigate the impact of any future flooding at Killyhelvin Water Treatment Works.

## Project Objectives

### The objectives to achieve these aims are:

1. To determine what action was required to give Killyhelvin WTW permanent protection in flood conditions.
  2. To assess the vulnerability of the WTW.
  3. To determine what measures must be taken in order to protect plant equipment to ensure the treatment works remains operational.
  4. To highlight possible future impacts.
- To determine if any redesign or construction of Killyhelvin WTW was necessary.

### May - October 2009



## Methodology

NI Water was part of the overall Fermanagh Flooding task force, which brought together the local and regional government agencies to learn the lessons and prepare for future issues. This provided access to funding and further specialist advice including modelling and hydrographical information.

The construction costs of the physical defences, bunds and flood barriers were relatively easy to estimate compared to the costs of the large number of small requirements, for example sealing ducts, tracing drainage locations which were critical to successfully protecting the WTW lower levels. In some locations which because of the processes used are directly exposed to lake levels controlled flooding was the only solution.

The development of flood defences required a holistic assessment of the site and consideration of the events likely to require the operation of the defences – in this case requiring a reliable emergency generator, to ensure that in extreme weather resulting in power failure the flood pumping station can operate and protect the WTW.

All lessons learnt will be incorporate into future flood protection plans for other sites.

## Key Challenges

The key challenges were:

Existing infrastructure was designed to operate within the expected lake levels as Upper Lough Erne was thought to be a managed system.

The WTW processes were laid out without consideration of the flood risk posed. The coarse screening process was 30m into the WTW site and next to the electrical control system for the inlet system, but was open to lake level – essential to the process but a significant flood risk. The clear water tank overflow was very close to the top flood level with a risk of ground water or lake water contaminating the potable water supplies

Poor ground conditions at the site which made construction of the defences more difficult.



Co. Fermanagh Flooding, November 2009

## Key Successes

The key successes were:

Killyhelvin WTW and sub-station now have increased resilience to lake flooding and extreme rainfall events, up to 1 in 100 level protecting water supplies for over 50,000 customers.

The defences are also designed to allow the positioning of further mobile defences in the event of a larger incident.

The sealing of ducts and pipework reduces water ingress to the basement levels of the WTW and reduces the risk of staff injury.

These mitigation measures also reduces the risk of equipment damage from water ingress.

Improvements to the standby generator allow the site to load, shed and reduce demand on the local electricity network, reducing the risk of interruptions to the electricity supply.

*“Although the project is complete it has yet to be tested in anger, but I am confident that if we ever experience floods to the extent of Nov/Dec 2009 we will be in a much better position and the WTW's should not be in any danger.”* **Roy Taylor – Water Supply Enniskillen Area**

## Solutions

The solution developed was a range of flood prevention and risk mitigation measures:

1. Physical permanent flood bund round the site.
2. Demountable flood barriers on access routes.
3. Land drainage diversions to flood pumping station.
4. Sealing of all underground access to the WTW.
5. Controlled flooding of buildings with lake access.
6. Protection of all exposed process points including chemical delivery and potable water storage.
7. Storm pumping station to deal with all drainage.
8. Electrical modification and raising of panels.
9. Waterproofing and dewatering of all conduits on site.
10. Upgrade of emergency generation.
11. Flood level warning alarms.



## Contact Details

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