

Understanding water levels on the River Shannon

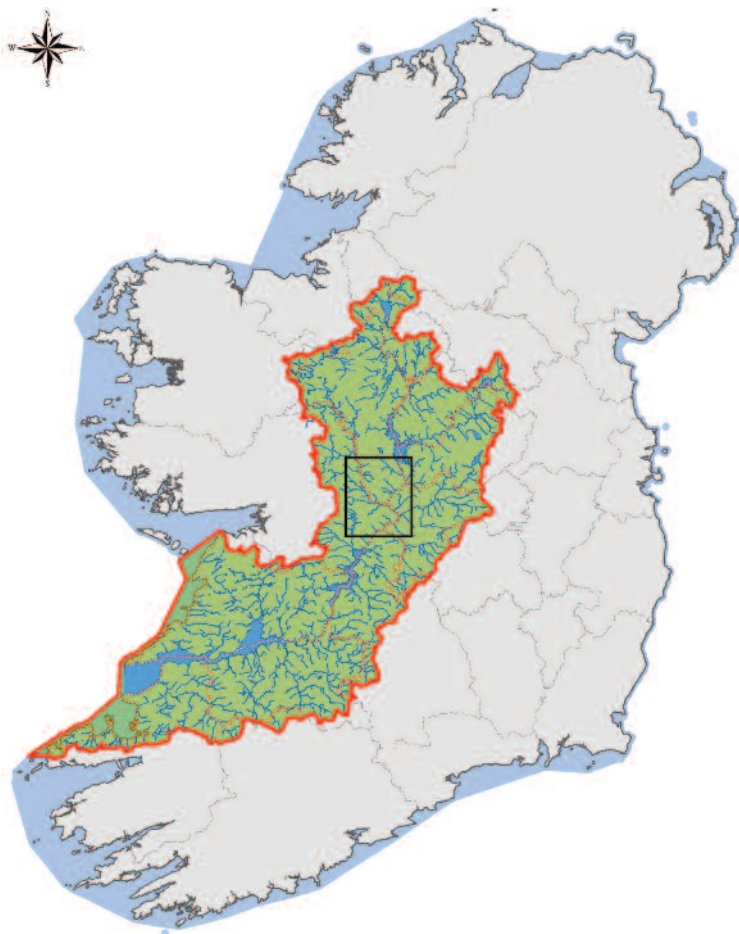


Introduction

In line with government policy, the Office of Public Works (OPW) is in the process of undertaking the Shannon Catchment-based Flood Risk Assessment and Management (CFRAM) Study to give us a clear and comprehensive picture of flood risk in the Shannon area and set out how the risk can be managed effectively and sustainably.

Based on technical work and information from stakeholders and local communities, we will generate detailed flood maps (due by the end of 2013) showing where current and future flooding is likely to occur. By 2015, we will produce Flood Risk Management Plans (FRMPs) which will set out specific programmes of measures and how the OPW, local authorities and other stakeholders, including the ESB and Waterways Ireland, should work together to address flood risks in the catchment.

In the meantime, a lot of work needs to be done to help us fully understand the risks of flooding and ensure that the flood maps and subsequent plans are properly informed, accurate and reliable. An important part of this early work is to research and understand the current operations of structures (e.g. weirs and sluices) along the River Shannon, who has responsibilities for water levels and how this impacts flood risk management.



Map of Ireland showing location of Shannon CFRAM Study area



Map of Shannon CFRAM Study area showing location of the Callows area between Athlone and Meelick Weir



What is the *River Shannon Level Operation Review* report?

The *River Shannon Level Operation Review* report is the output from a desk-based technical assessment that was carried out during 2011 which aimed to:

- Analyse existing data and available information on water levels and flows, and operating regulations for the control structures and dams at key locations along the River Shannon.
- Understand current stakeholder roles and responsibilities for water levels and operating procedures, and gather any relevant 'lessons learnt' and useful past experience via consultation with these stakeholders.
- Identify any suitable 'quick win' measures that could be taken to reduce flood risk or the extent of flooding, and potentially be implemented in the short term before the Shannon CFRAM Study is completed.

What is the purpose of this document?

This document provides a non-technical summary of the *River Shannon Level Operation Review* report. The full technical report can be viewed and downloaded from www.shannoncfрамstudy.ie.

The review has been undertaken without the benefit of the detailed hydrological analysis and hydraulic modelling (which is being carried out between 2012 and 2014 as part of the wider Shannon CFRAM Study). Therefore our recommendations are 'interim' and may be subject to refinement once more detailed technical analysis has been undertaken. We welcome your feedback and will make use of any new information when we reach that stage in the process.

Stakeholder responsibilities

Stakeholder input

Meetings were held with the Electricity Supply Board (ESB), Waterways Ireland (WI) and the Irish Farmers Association (IFA) in March and April 2011. These key stakeholders were invited to explain their role and responsibilities in the management of the Shannon and its floodplain, indicate their understanding of the current issues, and provide us with access to the necessary hydrometric data required for our technical assessment.

In relation to the operation of the water level control structures, Waterways Ireland reflects the interests of the many other stakeholders involved with recreational boating on the Shannon. Other stakeholders have an interest in the River Shannon. However, their areas of concern are less directly affected by the limited variations in water levels resulting from flood risk management operations addressed in the River Shannon Level Operation Review report.

Who is responsible for what?



The OPW is the lead agency for flood risk management in Ireland, and coordinates and implements government policy relating to flood risk management.

Under the Arterial Drainage Acts 1945 to 1995, the OPW carries out maintenance of Arterial Drainage Schemes on river channels such as the River Brosna and other tributaries, but does not have responsibility for maintaining the Rivers Shannon and Suck. The OPW is also responsible for implementing and maintaining Flood Relief Schemes, and provides funding to Local Authorities for minor flood alleviation schemes.



ESB has a mandate to generate electricity and its responsibilities on the River Shannon relate to the hydro-electric scheme, of which Ardnacrusha power station is the focal point.

ESB manages Loughs Derg, Ree and Allen in accordance with Regulations and Guidelines for the Control of the River Shannon – this document has no statutory basis but reflects the outcomes of longstanding consultation with key affected parties and aims to:

- ensure dam safety;
- maintain navigation levels which in turn assures adequate water supply and quality for Local Authorities and Inland Fisheries Ireland; and
- minimise flooding for the agricultural sector and general public.

ESB collects and maintains records of rainfall, river and lake levels and flow data. Even though ESB has no responsibility to supply flood warnings under their regulations, it issues twice weekly lake level forecasts to all the relevant stakeholders since 2010.



The IFA represents numerous farmers in the Shannon catchment and is concerned about the noticeable increase in flooding to their land over the past 20 years. They attribute the increase not only to changes in climate patterns, but also to the activities of other stakeholders.

In 2002, the IFA and its members drafted a set of proposals to resolve flooding from the River Shannon, some of which have been addressed by the OPW in subsequent studies, works and liaison.



WI is responsible for navigation on the inland waterways system and has various legislative powers and functions. Under the British-Irish Agreement and Shannon Navigation Acts, Waterways Ireland is the Body responsible for the management, maintenance, development and restoration of the Shannon Navigation principally for recreational purposes.

WI operates a number of locks and associated weirs on the Shannon. These structures were designed to maintain water levels for navigation in the main channel, and can therefore contribute to higher upstream flood levels than if the structures were not present. WI operates sluices at each lock to limit this rise in upstream water levels. However once the sluices are fully open, no further control over flood waters is possible.

WI works closely with the ESB to ensure levels in Loughs Derg, Ree and Allen are maintained for navigation. Athlone Weir is owned by WI but the sluices are only operated on the instruction of ESB. Occasional maintenance work is needed to remove obstacles or small rock shoals - WI must consult extensively with National Parks and Wildlife Service (NPWS), Inland Fisheries Ireland and the Environmental Protection Agency (EPA) before this is carried out.



National Parks & Wildlife Service

NPWS prepares and manages policy relating to the natural environment and has national and international responsibilities. Under the Birds and Habitats Directives and Wildlife Acts, the Shannon callows has been designated as a Special Protection Area (SPA), Special Area of Conservation (SAC) and National Heritage Area (NHA).

The role of NPWS is to secure the conservation of ecosystems and maintain or enhance populations of flora and fauna. Habitats include turloughs, fens (which are often sensitive to water level fluctuations), lakes, rivers, bogs and important floodplain habitats such as the Shannon callows.



What did the *River Shannon Level Operation Review* tell us?

Our findings

Over the last two centuries numerous reports have addressed concerns and possible solutions to the issues of managing flood risk on the River Shannon. Our review of this literature confirmed that different interest groups have had concerns relating to water levels on the Shannon over an extended period of time. The literature review allowed us to gain a historical perspective of the impacts of navigation, hydropower generation, environmental aspects, farming and flood risk, and take on board any relevant findings and learning in our recommendations.

Our analysis found that the operation of the control structures at Lough Allen (Bellantra Sluices), Parteen Weir, Ardnacrusha Power Station and the navigation weirs upstream of Lough Ree does not have a significant impact on the occurrence, degree or duration of flooding. The area of greatest concern is the callows area between Athlone Weir and the water level control structures in the vicinity of Meelick and Victoria Lock. The *River Shannon Level Operation Review* report (and this summary document) therefore focuses on this area.

What is the problem?

The callows is an area of semi-natural grassland with international environmental designations and is managed by individual landowners, most of whom are represented by the Irish Farmers Association (IFA). It is generally accepted that, as a natural floodplain, the farmland is liable to flooding in the winter. However, the IFA have expressed significant concern over summer flooding, particularly flooding occurring during late summer (i.e. 16 August to 30 September) as this can cause major damage to crops before they are harvested and reduce the length of time livestock can graze on the land.



Why has late summer flooding increased in recent years?

Water level records confirm the widely held perception that late summer flooding has been significantly greater in the last decade than over the previous four decades. Although before this, late summer flooding in the 1940s and 50s was more frequent than in recent years (since 2002). Rainfall records show that the reason for the increase is likely to be a result of natural variations in the climate. Our review finds no evidence that the changes in operating procedures which occurred in 1972 has had a direct impact on the frequency of late summer flooding in the callows.

What causes flooding in the callows?

Flows from other rivers feeding into the Shannon?

Flows from other rivers feeding into the Shannon have a significant influence on flooding in the callows. Measurements show that in non-flood conditions, a quarter of the water flowing into the callows comes from the River Suck and River Brosna. However, this rises to over 40% during the onset of a flood event and in August 2008 this proportion actually rose above 60%.

Sluice operations at Meelick and the New Cut?

A comparison between Waterways Ireland records of sluice openings and water level records over the summers of 2007 to 2010 shows that all 30 sluices were fully opened when downstream water levels at Athlone exceeded the 'trigger' level for potential waterlogging of the callows. Our analysis also shows that flood waters typically peak in the callows between 10 and more than 30 days after all sluices are fully opened and all weir boards removed. This means that sluice operations at Meelick and the New Cut have no adverse impact on flooding in the callows, provided Waterways Ireland operate the sluices and remove the weir boards in accordance with the normal operating procedures.

Local channel constrictions and storage?

Examination of the effects of water storage (in the section of the River Shannon between Athlone and Meelick) and local channel constrictions (e.g. at Madden's Island / Counsellor's Ford, near Esker downstream of Banagher) would require more detailed hydraulic modelling which will not be available until later in the CFRAM Study. However, our initial analysis shows that whilst such effects may be significant at low flows, they are unlikely to impact the size or duration of a flood in the callows.

Our recommendations

Could recent summer floods have been managed differently?

The summers of 2008 and 2009 were particularly wet. In the absence of any reliable long term forecasting, ESB exercised its discretion not to open the sluices and possibly exacerbate flooding in the callows. We looked to see whether the impacts of the summer floods could have been reduced if the water level in Lough Ree was 'drawn down' as far as possible towards the minimum level using the Athlone sluices in accordance with ESB Guidelines. Our analysis ignored the practical limitations of accurately forecasting inflows to the callows and co-ordinating sluice operations at Athlone weir to maintain a steady level in the callows at the onset of waterlogging. Our studies showed that, in theory, Lough Ree levels could have been drawn down somewhat prior to the summer floods in 2008 and 2009. However, whether the Athlone sluices are opened in advance of a flood or not, this only has a marginal effect on the timing of a summer flood and has no influence upon the extent or total duration of the flooding. The regulation of water levels is constrained by naturally high lake levels in wet summers and the ESB Guidelines that are in place to ensure water levels are adequate to meet navigation and water supply requirements towards the end of dry summers.

Immediate or short term actions

We have identified no immediate measures that could be implemented to reduce flood risk or the extent of flooding in the short term before the Shannon CFRAM Study is completed.

In the short term, operation of the sluices at Athlone should continue to follow the ESB Guidelines which intend to optimise storage in Lough Ree for summer floods while allowing leeway to meet navigational and current water supply requirements in dry years.

Issues for wider consideration

A number of issues have been identified that will be considered by the CFRAM Study as work progresses:

- Develop detailed hydrological and hydraulic models to assess whether measures, such as changes in the operational procedures along the Shannon, improvements in channel capacity or the holding back of flows from the Rivers Suck or Brosna, could reduce flood risk in the callows area.
- Compare river cross sections at critical locations along the Shannon with historic cross sections to address IFA concerns about increased siltation and determine whether siltation has reduced the flow capacity of the channel.
- Ongoing engagement with NPWS in relation to environmental matters.

How to contact us

You have an important role to play and we are keen to hear from you as the Shannon CFRAM Study develops. If you have any questions about the *River Shannon Level Operation Review* or any other general queries, please do not hesitate to contact us.

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