

02 - CFRAM – Assessing Irelands flood risk with a focus on public and stakeholder engagement

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Abstract

The Catchment-based Flood Risk Assessment & Management (CFRAM) Programme, 2010-2018, identified communities at significant flood risk across Ireland. Managed by technical and administrative staff within the OPW, and using the resources and expertise of surveying companies and specialist engineering consultancies, the work included detailed surveys, statistical analysis, and computer modelling to develop flood-maps and identify and evaluate measures to manage or alleviate the flood risk in communities. Key technical outputs included:

- Detailed river and tidal flood-maps for 300 communities;
- 29 Flood Risk Management Plans setting out strategies to manage flood risk into the future,
- Recommendations and 'outline concept designs' for 118 flood relief schemes.

The maps and Plans were delivered in line with the European Directive on the Assessment and Management of Flood Risk (2007/60/EC).

The primary application of the flood Plans are the 'outline concept designs' for communities which would provide protection to 11,500 properties at an estimated cost of EUR500m, representing a significant step towards the OPW protecting 95% of Ireland's at-risk properties from extreme floods.

The CFRAM Programme had multiple stakeholders that informed the Programme, provided governance structures, supported decision-making and promoted development of new policy initiatives, all of which directly benefit the public. Over 500 public consultation days as well as two rounds of statutory consultation online were held. The outcome of the public and stakeholder engagement on the CFRAM programme were two fold.

For the CFRAM Programme itself the engagement raised awareness and harnessed the input of the public - both in terms of the flood-maps, and the proposed measures to manage flood risk in their area

For future OPW work, the engagement experience from the CFRAM Programme has been developed into an updated 'design led' approach. This should ensure that all stakeholders will have an input to a process that coordinates and delivers on everyone's interests and needs and forms a more unified water management policy to share and coordinate investments, an approach that ensures maximum public and stakeholder engagement in the long term strategy for water management in Ireland.

1. INTRODUCTION TO THE OPW ROLE IN FLOOD RISK MANAGEMENT

The Office of Public Works (OPW) is the lead State body for the coordination and implementation of Government policy on the management of flood risk in Ireland. The OPW is also the national authority for the implementation of the EU Directive on the Assessment and Management of Flood Risks. The OPW has responsibility for leading and co-ordinating the implementation of the National Flood Risk Policy approved in 2004 which involves the development of a planned programme of prioritised feasible works, with a greater emphasis for non-structural measures. The OPW coordinates

the sectoral activities of other Departments and Agencies, primarily through the Inter-Departmental Flood Policy Coordination Group. The proactive and whole of Government response to flooding is being led by OPW across three strategic areas:

- Prevention - avoiding construction in flood-prone areas.
- Protection - taking feasible measures to protect areas against flooding.
- Preparedness - planning and responding to reduce the impacts of flood events.

There is extended material on each of these three strategic areas, and the role of OPW, available for viewing at https://www.floodinfo.ie/about_frm/

Central to the implementation of the new flood policy in Ireland is the pro-active, catchment-based assessment and management of flood risk – the Catchment Flood Risk Assessment and Management (CFRAM) Programme.

2. NATIONAL CFRAM PROGRAMME

The OPW undertook the National Catchment Flood Risk Assessment and Management (CFRAM) Programme to give a clear and comprehensive picture of flood risk in areas of potentially significant flood risk and to set out how to manage the flood risk effectively and sustainably. The Programme focussed on 300 communities at potentially significant flood risk, referred to as Areas for Further Assessment (AFAs). These were identified through a national screening exercise and include in the order of 80% of properties at risk in Ireland from rivers and seas, the primary sources of flooding in Ireland. 90 of these 300 areas were coastal areas.

Six CFRAM study areas were assigned under the National CFRAM Programme. The OPW engaged with the Rivers Agency of Northern Ireland during the CFRAM Programme for those rivers that cross into or flow out of Northern Ireland.

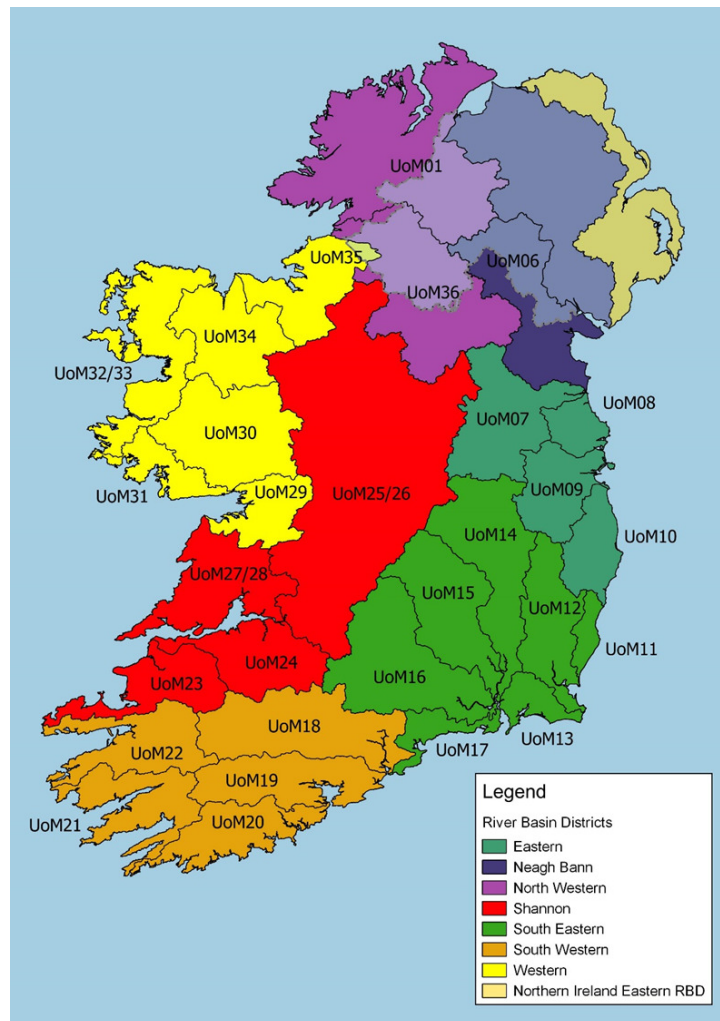


Figure 1: CFRAM RBDs and UoMs.

The process to scope and develop the CFRAM Programme had three principal phases which led to the development of 29 Flood Risk Management Plans:

- 2012 - Preliminary Flood Risk Assessment (PFRA)
- 2015 - Preparation of Flood Maps
- 2017 - Preparation of Flood Risk Management Plans (FRMPs)

2.1 Preliminary Flood Risk Assessment (PFRA)

The PFRA was an analysis process to identify areas where the flood risk was determined to be potentially significant from one or more sources of flooding. It was not possible to address all flood problems in the country in one programme, and so the OPW prioritised the areas of greatest potential risk and impact. These areas were referred to as Areas for Further Assessment (AFAs).

The PFRA was not a detailed assessment of flood risk. It was rather a broad assessment, based on available and readily derivable information to identify areas where there was a genuine cause for concern about a risk and impact of flooding that may require further assessment. The OPW used three sources of information to designate these 300 areas;

- Historic information on floods that happened in the past.
- Public consultation to gain local and expert knowledge from Local Authorities and other Government departments and agencies to identify areas prone to flooding and the potential consequences.

- Engineering techniques to analyse potential damage that could be caused by flooding.

300 AFAs were designated, of which 90 are coastal communities.

2.2 Preparation of Flood Maps

Predictive flood hazard and risk maps were prepared for each AFA, to identify and map the existing and potential future risk from flooding in these areas. This involved extensive survey and subsequent engineering analysis of the river systems, estuaries and coastal areas, including hydrology and detailed hydraulic modelling. The OPW assessed and mapped the flood extents, hazard and risk for a range of flood events from frequent, minor flood events up to very rare, extreme events.

Flood maps developed include Flood Hazard Maps that describe the characteristics of each predicted flood scenario, such as the land areas prone to flooding, its projected depth and level, and the calculated flow and velocity (speed) of the floodwater. Flood Hazard Maps help assess the potential impacts of possible future floods, which are presented on the Flood Risk Maps that describe these impacts on people, the community, the economy and the environment.

The flood maps have multiple applications, including;

- supporting sustainable planning & development management (thus ensuring development in floodplains is avoided or appropriately controlled)
- informing emergency response agencies about the nature of flooded areas during floods;
- aiding investment and policy decisions for flood risk management;
- informing the public about potential risks to themselves or their properties.

2.3 Preparation of Flood Risk Management Plans (FRMPs)

Flood Risk Management Plans were prepared to identify feasible structural and non-structural measures to effectively manage the assessed risk in each of the AFAs and their river catchments. The FRMPs looked at all types of flood risk management measures, structural and non-structural, to identify a proposed measure that will deliver optimum results taking into consideration multiple factors including, value for money, cost, benefits and environmental factors.

2.4 Next steps – Flood Relief Schemes

Each flood relief scheme identified in the FRMPs will now be brought through project-level development, further public and stakeholder engagement, detailed design and a local Public Exhibition or submission for planning approval or confirmation. The outputs from the detailed design may give rise at that stage to some amendment of the proposed works to ensure that it is fully adapted, developed and appropriate within the local context and that it is compliant with environmental legislation and is economically feasible. These OPW schemes, in addition to other schemes currently being undertaken directly by the Local Authorities, will provide protection to approximately 21,500 properties. In addition, the OPW has approved 660 Minor Works Projects since 2009 to end 2017 and almost 500 of these are completed providing protection locally to almost 6,500 properties.

Delivery of the structural measures in the Plans will be the responsibility of the OPW with delivery progressed in partnership with the Local Authorities. In total 122 communities are to benefit from delivery of 118 proposed schemes. Delivering new major flood relief schemes is being divided into the following three categories to firstly inform allocation of annual budgets against expenditure

targets, secondly to manage delivery of these schemes through a prioritised approach and thirdly deliver schemes in a regional and timely manner;

- 5 Large Schemes: each costing in excess of €15m and will protect one third of properties assessed by CFRAM to be at risk.
- 82 Small to Medium Schemes: each costing between €1m and €15m with delivery prioritised and managed in each CFRAM study area.
- 31 Minor Schemes: each costing less than €1m approximately, where it is more expedient for the Local Authorities to lead with OPW funding.

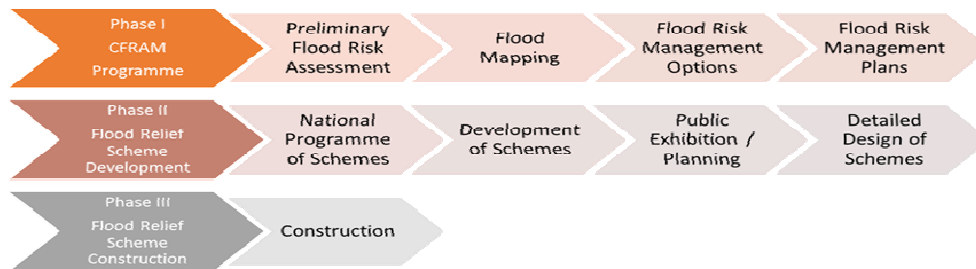


Figure 2: Flood Relief Schemes – Next Steps (note – currently at ‘Development of Schemes’ stage)

2.4 Next steps – Non-Structural

The CFRAM Programme has provided the evidence to further analyse and where appropriate develop additional flood policies to protect those at risk properties where it is not feasible through structural measures to protect them against their assessed flood risk. This includes approximately 5% of at risk properties within the 300 AFAs that it is not feasible to protect with structural flood relief schemes *and* properties that were not assessed through the CFRAM Programme and not protected by Minor Works. The OPW will continue this work by bringing forward further feasible proposals for Government’s consideration to support and assist households and communities through non-structural flood risk management and mitigation measures, again looking at the three areas of *Prevention*, *Protection* and *Preparedness*.

Flood *Prevention* Measures under Development are focussed on the areas of Sustainable Planning and Development management, Natural Water Retention Measures, Sustainable Urban Drainage Systems (SuDS) and Climate Change Adaptation Planning.

Flood *Protection* Measures under Development are focussed on the areas of Turloughs and Wetlands.

Flood *Preparedness* Measures under Development are focussed on the areas of Flood Forecasting and Warning, Emergency Response Planning, Flood Related Data Collection, Individual Property Protection (IPP) and Promotion of Individual and Community Resilience.

There is more information on each of these areas of focus available at https://www.floodinfo.ie/about_frm/flood_risk_measures/

Future Cycles of EU Floods Directive

The requirement under the EU Floods Directive is to review and, if necessary, update the PFRA, the Flood Maps and the FRMPs, on a six yearly cycle. This includes monitoring and reporting on the progress in implementation of the current Plans. Where possible, revised and improved approaches will be used to re-assess flood risk and how it should be managed as an integral part of the second cycle of implementation, which may include further assessment of rural flooding and of impacts on critical infrastructure.

3. PUBLIC AND STAKEHOLDER CONSULTATION ON CFRAM

Figure 3 below gives a visual overview of the ‘typical’ public and stakeholder consultation and engagement undertaken for one of the six CFRAM Studies in the National Programme.

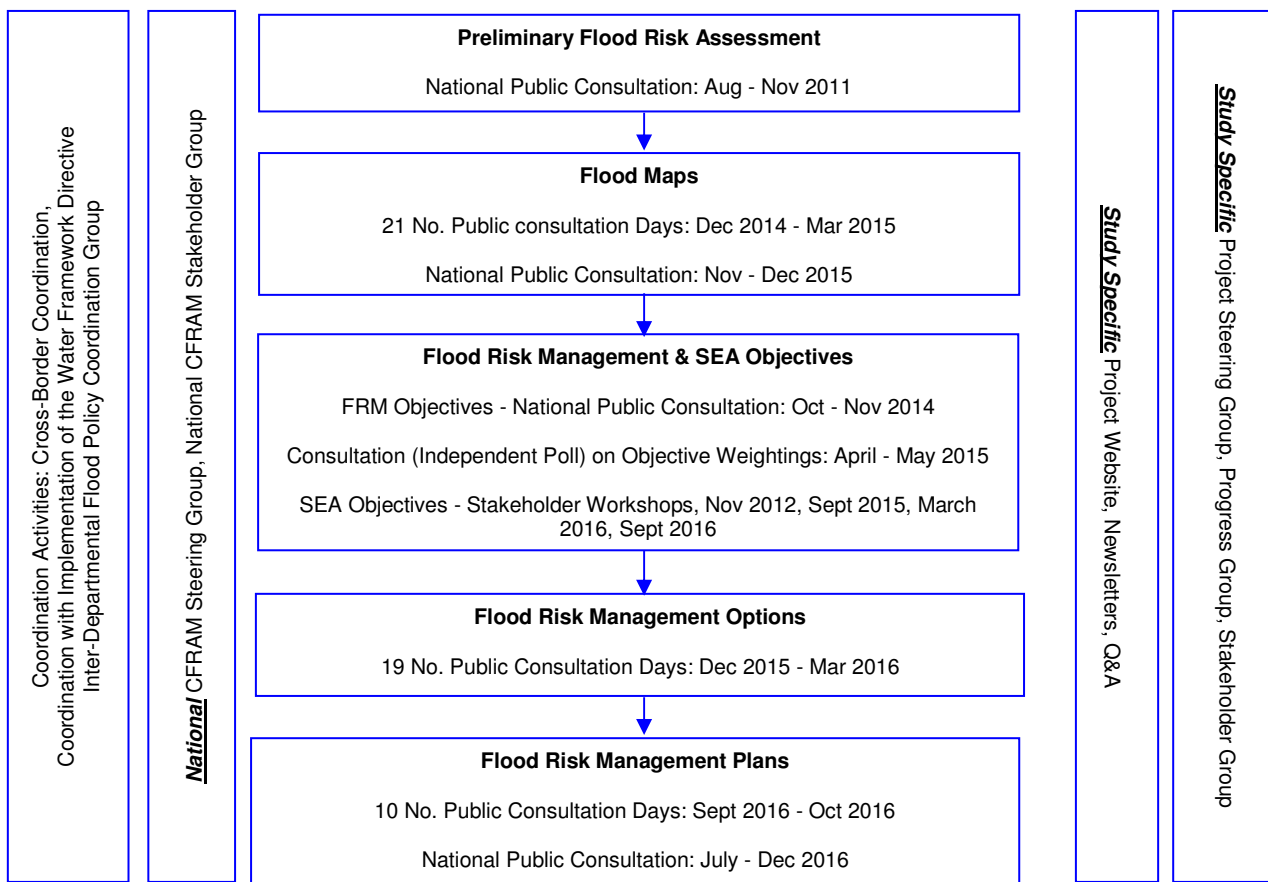


Figure 3: Overview of CFRAM Public and Stakeholder Engagement– Sample shows NWNB CFRAM study

3.1 Stakeholder Engagement – Steering Groups, Progress Group, Stakeholder Groups.

Steering Groups - The National CFRAM Steering Group - Established in 2009, the National CFRAM Steering Group met on nine occasions. It provided for the engagement of key Government Departments and other state stakeholders in guiding the direction and process of the implementation of the 'Floods' Directive, including the National CFRAM Programme. The National CFRAM Steering Group reported, through the OPW, to the Inter-Departmental Flood Policy Coordination Group.

Steering Groups - Study Specific Project Steering Group - A Study Specific Steering Group was established for each Study and provided for the input of the members to guide the CFRAM Programme and act as a forum for communication between the CFRAM Programme and senior management of key stakeholders. The Project Steering Group typically met twice a year.

Progress Group - A Study Specific Progress Group was established for each Study as a working group that supported the Project Steering Group and met approximately every six weeks. The Group was established to ensure regular communication between key stakeholders and the CFRAM Project and to support the successful implementation of the Project.

Stakeholder Group - The National CFRAM Stakeholder Group - The National CFRAM Stakeholder Group was established in 2014, and met three times to provide for the engagement of key national non-governmental stakeholder organisations at key stages in the implementation of the National CFRAM Programme.

Stakeholder Group - Study Specific (Regional) CFRAM Stakeholder Group - A Study Specific Stakeholder Group was established for each study. It was established to provide for the engagement of local non-governmental stakeholder organisations at key stages in the process of the implementation of the relevant Study in question.

3.2 Consultation at different stages

In addition to the structured engagement with relevant stakeholders through the Steering, Progress and Stakeholder Groups, the public were given the opportunity and encouraged to engage with the implementation of the 'Floods' Directive and the CFRAM process. This occurred for thematic milestones for the PFRA, the Flood Mapping, the Objectives, the Options and the FRMPs.

Consultation on Preliminary Flood Risk Assessment - Consultation was undertaken during the preparation of the draft PFRA. The OPW held two rounds of workshops (Summer 2010 and Winter 2010-2011) involving all local authorities who provided information on areas known or suspected to be at risk from flooding, and reviewed provisional Areas for Further Assessment (AFAs) identified by the OPW in relation to fluvial and coastal flood risk.

Consultation was also held with stakeholder organisations to inform the process and draft outcomes of the PFRA. These organisations included Government Departments, the EPA, Waterways Ireland and a range of utility operators in relation to the location and potential vulnerability of utility infrastructure.

In August 2011 the OPW published the Draft PFRA for consultation on the National CFRAM Programme website, and placed it on public exhibition in the principal offices of all city and county councils. The public consultation extended to 1st November 2011 and Submissions were invited in writing, by email, or via the website.

Consultation on Flood Maps - The initial preparation of the flood maps involved extensive consultation with the Study Specific Progress Groups and planners within the various relevant local authorities. This led to the development of draft flood maps that were then consulted upon with the public through local Public Consultation Days, (PCDs), and a national, statutory consultation. PCDs were advertised locally in advance, and were held at a local venue in the community during the afternoon and early evening. OPW, Local Authority and Consultancy staff were present to explain the maps that were displayed in the venue and answer any questions on the maps and the CFRAM process, and to collate local information to refine or confirm the maps. SI No. 122 of 2010 stipulated that a national consultation exercise should be undertaken. This consultation on the flood maps for all areas was launched in November 2015.

Consultation on Flood Risk Management Objectives - The Flood Risk Management Objectives of the National CFRAM Programme define what the process is trying to achieve in terms of reduction of flood risk, and where possible provide wider benefits, to human health, the environment, cultural

heritage and economic activity. The OPW considered it appropriate to publicly consult on the proposed flood risk management Objectives, and launched a public consultation in October 2014.

A Multi-Criteria Assessment (MCA) is used as part of the process for assessing potential options for reducing or managing flood risk for each AFA. The MCA makes use of weightings to rank the importance of the Objectives. The OPW considered it appropriate to consult on the weightings that would be assigned to each Objective, and commissioned an independent poll of over 1000 members of the public on the weightings through a structured questionnaire.

Consultation on Options - Based on the flood hazard and risk identified in the flood maps, options for reducing or managing flood risk in each AFA were developed and assessed. PCDs, similar to those held for the consultation on the flood maps were held during the development and assessment of options. These were an opportunity to engage with the community and for the community to set out what local issues were particularly important and what measures they considered would be most suitable and comment on which identified options might be effective and appropriate, or otherwise.

Consultation on Draft Plans - All Study specific Draft Plans were published for the purposes of public consultation. Presentations were made to Councils during the public consultation period. Observations from the public and from relevant Councils were submitted to the OPW.

In parallel and complementary to the formal public consultation process, a series of PCDs, similar to those held for the consultation on the flood maps were held to engage locally and directly with the community and provide people with opportunity to discuss and fully understand the Draft Plans.

3.3 Co-Ordination

Coordination with the Implementation of the Water Framework Directive

The Water Framework Directive, (WFD), is concerned with the protection of the ecological quality of our waters. While the 'Floods' Directive is concerned with the protection of people and society from our waters, both Directives are concerned with water and river basin management, and coordination was required to promote integrated river basin management, achieve joint benefits where possible and address potential conflicts. There has been, and will continue to be, coordination with the authorities responsible for the implementation of the WFD through a range of mechanisms, including bi-lateral meetings and cross-representation on various management groups.

Cross Border Coordination

The OPW has an on-going relationship with the former Rivers Agency (now part of the Dept. for Infrastructure), Northern Ireland, which is the Competent Authority for the implementation of the 'Floods' Directive in Northern Ireland. A Cross-Border Coordination Group was established to coordinate the implementation of the 'Floods' Directive across the border, and was supported by a Cross-Border Technical Coordination Group. These groups first met in February 2010 and November 2009 respectively, and met on a number of occasions to coordinate on the identification of areas at significant risk, to share information and agree approaches to and the production of flood mapping in border areas and to coordinate on the identification of measures and the preparation of Plans.

Where relevant, (primarily on the NWNB CFRAM Study), Rivers Agency have been represented throughout the CFRAM study on the steering, progress and stakeholders groups. Rivers Agency and

the OPW have undertaken information exchange at all deliverable stages, including delivering joint presentations to stakeholders and also joint attendance at relevant consultation events.

3.4 Engagement via OPW Websites

Table 1 below provides a list of the operational OPW websites that are used to convey the work of the OPW during public and stakeholder engagement.

Table 1: Relevant OPW websites for the purpose of public and stakeholder engagement

Website	Content
opw.ie	Flood Risk Policy and Co-ordination activities, Information on Major Flood Defence Schemes, the Minor Flood Mitigation Works & Coastal Protection Schemes, OPW Arterial Drainage Schemes. Maps prepared by the Irish Coastal Protection Strategy Study.
cfram.ie	An individual project website for each of the six separate CFRAM studies - reports, events, newsletters, PCDs....
floodinfo.ie	Providing access to Flood Plans and Flood Maps developed by the OPW and information on flood risk management in Ireland.
flooding.ie	This OPW website provides information for members of the public to help plan, prepare and protect for flood events.
maps.opw.ie	This OPW applications website hosts maps including information on completed flood defence schemes and arterial drainage schemes.
waterlevel.ie	Access to hydrometric data that has been collected and processed by the OPW for over 70 years.
flooding.ie	This OPW website provides information for members of the public to help plan, prepare and protect for flood events.

4. PUBLIC AND STAKEHOLDER CONSULTATION - LESSONS LEARNED

The OPW has learned a range of lessons from the Public and Stakeholder engagement process outlined above. These can be split into two categories, *technical* and *procedural*.

The *technical lessons learned* are the instances where observations submitted to the OPW through the engagement processes were considered and the Plans amended accordingly where appropriate.

The *procedural lessons learned* are different in that these will be used to improve future planned Public and Stakeholder engagement processes – such as for the implementation of measures arising from the Plans.

4.1 Lessons Learned – Technical – looking at all stages

PFRA Submissions

52 submissions received under the public consultation process raised technical issues such as;

- Recommendations for the inclusion of locations for designation as AFAs, and / or expressions of concern related to past flooding, or the potential for flooding, of a particular location
- Comments that certain bodies, and / or their past or ongoing actions, were responsible for causing or aggravating flooding or flood problems.
- Requests for inclusion in the consultation / engagement process for the CFRAM Studies.
- Comments relating to past planning decisions and / or recommendations for changes to planning law.
- Queries on the accuracy of, or suggested correction to, the PFRA maps
- Recommendations as to how flood risk in a location / region could be managed, or concerns as to how future flood risk management could have detrimental impacts.

All submissions were also considered, in parallel with the findings of the Flood Risk Review in the final designation of the AFAs.

Flood Mapping Findings

The PCDs were very useful both in updating and validating the flood maps, as a means to raise awareness of flooding and flood risk in the community, and to begin the discussion on potential measures to manage or reduce the risk. Observations and Objections submitted through the consultation process were assessed and the flood maps amended accordingly, where appropriate.

Consultation on objectives - Findings

Submissions received were duly considered and amendments made to the Objectives where appropriate to inform the finalising of the Objectives in March 2015.

Consultation on weightings - Findings

The results of this poll were analysed by UCD, and the weightings for each of the Objectives were then set.

Consultation on draft FRMPs - Findings

The observations submitted to the OPW through the public consultation processes were considered and the Plans amended accordingly where appropriate. In addition to this, a series of matters arose that were not directly within the control of the OPW and the remit of the Flood Risk Management Plans, and in these instances the OPW communicated these issues on to the relevant third party such as the Local Authority or other competent body. A synopsis of the observations submitted and amendments made to the Plan arising from the observations is available from the OPW website (www.opw.ie/FloodPlans). More detail is provided below on this particular element of the public and stakeholder consultation.

4.2 Lessons Learned – Technical – focus on FRMP observations

Over 500 observations were submitted under the formal public consultation process on the 29 draft Plans, with most of the observations submitted by members of the public. Most typically comprised a number of different issues or points, sometimes setting out a large number of different issues.

Table 2: Breakdown in Observations on the FRMPs received by source

Source	% of Observations
Members of the Public	54%
Associations / Non-government Organisations	12%
Businesses / Business Organisations	11%
Local Authorities / Councils	7%
Government Departments / State Agencies	7%
Politicians – National, Local	6%
Semi-State Organisations	2%

Some common issues were raised in a number of separate observations. Some such issues were identical in separate observations, i.e., the same issue being made on more than one of the draft Plans. Other such issues were of a similar nature or common theme, but were made by different people or organisations relating to the same location, and/or were made by the same person or organisation but relating to different locations. An example of such issues would be comments opposing or supporting

a proposed measure for a particular location, or a comment expressing a particular concern in relation to different locations.

These frequently raised issues, and responses to them, are presented (in a generalised form) in section 3 of a summary report on Public Consultation on the Draft Flood Risk Management Plans which is referenced at the end of this paper.

These ‘Frequently Raised Issues and Responses’ are arranged into the following categories;

- General Issues (incl. Insurance, Planning, Implementation of Next Stages...)
- Environmental Issues (incl. engagement with WFD, monitoring, mitigation, NWRM....)

All of the observations submitted to the OPW through the public consultation process were fully considered by the OPW and its consultants. The action arising from each issue raised was dependent on the nature and the context of the issue. Actions taken have included, but are not limited to:

- A review of the proposed measure, and amendment of the measure set out in the draft Plan.
- A review of the proposed measure, and noting of the issue for consideration at the project-level of assessment (i.e., the future development and detailed design of the measure before implementation).
- A review of the proposed measure, and a decision that the measure set out in the draft Plan should not be amended.
- An amendment to the Plan, other than an amendment to a specific measure.
- An amendment in relation to the environmental assessments, such as the consideration of additional mitigation and/or monitoring measures.
- Raising of the issue with a third party, e.g., a local authority, to whom the issue would be relevant.
- Noting of the issue as a matter to guide or be addressed in the second cycle of the implementation of the EU 'Floods' Directive.

Other individual specific issues raised through the consultation process were fully considered and informed the Plans. They will further be taken into account and inform the detailed design when the proposed measures are further developed at a local, project level before Public Exhibition or submission for planning approval. It is important to note that further public and stakeholder consultation will be undertaken at the project-level assessment of measures comprising community flood protection schemes prior to submission for planning permission or Public Exhibition and confirmation (in the case of projects being implemented by the OPW under the Arterial Drainage Acts) for the implementation of the scheme.

4.3 Lessons Learned – Procedural

The project development stage for schemes will involve a significant level of further local engagement at key points of the design work required to bring those proposed measures to a state of readiness to submit for planning approval (for projects being implemented by local authorities under the Planning and Development Acts) or for Public Exhibition (in the case of projects being implemented by the OPW under the Arterial Drainage Acts). The primary *procedural* lesson learned from the engagement through the CFRAM process is that future engagement need to be as collaborative as possible and to use a ‘design led’ approach to encourage shared decision making.

A well run, collaborative process will lead to successful outputs; decisions that are transparent and accountable and have stakeholder buy-in. Flood risk management measures should be appraised and designed to consider potential broader benefits and impacts, such as for water quality and community enhancement. For future engagement processes this approach increases social capital and establishes trust and cooperation. The tools and techniques that are proposed focus on the following key stages;

- Stakeholder identification – finding the appropriate participants to ensure maximum legitimacy and credibility throughout the engagement process;
- Technical Workshops – to confirm level of risk associated with the project, identify needs including wider community objectives,
- Opening Public Consultation Day – information giving, also further scoping and understanding stakeholder perspectives and any new needs and community objectives;
- Opening Collaborative Workshops – finalise all known needs, creatively look for solutions, benefits, desired outcomes for the technical detailed design team;
- Design Review Collaborative Workshop – technical detailed design team report back with the output information to the workshop group for review and finalisation;
- Closing Public Consultation Day – provide the output information to all stakeholders;
- Planning Approval Process.

These tools and techniques will be used earlier in the process than is traditionally associated with schemes, very early in the Planning Approval Process in order to ensure the correct stakeholders are providing the best information and feedback. The design team can then use this feedback to develop stakeholder ideas into the next phase of the design. This design led approach, while based on engineering principles, can be extended to integrate a wider spectrum of needs such as biodiversity, urban planning, agricultural development, public realm and so on, into a single unified vision.

5. CONCLUSION

The Catchment-based Flood Risk Assessment & Management (CFRAM) Programme was the largest study of flood risk ever undertaken by the State. The Programme, following best international practice, assessed and mapped flood risk for communities that are home to approximately 3 million people (two-thirds of the national population) and identified the most effective and affordable means of protecting the communities assessed from the impacts of flooding, including that associated with climate change.

The CFRAM Programme provided the robust evidence to support the €1bn prioritised capital investment commitment by Government in flood relief measures over the coming decade, protecting 95% of properties that are at risk from flooding within the 300 communities assessed under the Programme.

The public and stakeholder engagement carried out was based on probabilistic theory; technical and engineering-led work. Participation was encouraged in a range of ways yet there remains a perception that solutions may be largely based on an ‘engineering risk’ perspective.

For the implementation of schemes, OPW recognises that a ‘design led’ approach is complimentary to the more traditional probabilistic/engineering-led approach. The OPW already plays a key role in increasing levels of collaboration with external stakeholders and other governmental bodies. The improvements in public and stakeholder engagement that were learned from the CFRAM Programme

will ensure that the broad range of stakeholders with an interest in any given flood risk management scheme will well become increasingly coordinated in time to form a more unified water management policy to share and coordinate investments in line with the intentions of EU water policy.

7. ACKNOWLEDGEMENTS

Sincere thanks are extended to a large number of organisations whose assistance, input and provision of data contributed to the CFRAM Programme. These include: Office of Public Works, JBA Consulting, Mott MacDonald Consulting, Jacobs Engineering, RPS Consulting Engineers, Local Authorities, Department for Infrastructure – Rivers and Flooding – Northern Ireland, The Environmental Protection Agency, Met Éireann, All members of the National and Study Level CFRAM Steering, Progress and Stakeholder Groups.

8. REFERENCES

OPW, (2018) *Public Consultation on the Draft Flood Risk Management Plans – Summary Report*.
<https://www.floodinfo.ie/publications/?t=33>