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COMMISSION STAFF WORKING DOCUMENT

First Flood Risk Management Plans - Member State: Ireland

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Acronyms

AA	Appropriate Assessment
AFA	Areas for Further Assessment (Areas of Potential Significant Flood Risk)
APSFR	Areas of Potential Significant Flood Risk
CFRAM	National Catchment Flood Risk Assessment and Management Programme
CBA	Cost-Benefit Analysis
DHPLG	Department of Housing, Planning and Local Government
E-BCR	Economic Benefit-Cost Ratio
EEA	European Environment Agency
EIA	Environmental Impact Assessment
EPA	Environmental Protection Agency
FD	Floods Directive
FHRM	Flood Hazard and Risk Map
FRMP	Flood Risk Management Plan
IFI	Inland Fisheries Ireland
LAWCO	Local Authority Water & Communities Office
M-BCR	MCA Benefit-Cost Ratio
MCA	Multi-Criteria Analysis
NCCAF	National Climate Change Adaptation Framework
NDP	National Development Plan
NGO	Non-Governmental Organisation
NIG	National Implementation Group
NPWS	National Parks and Wildlife Service
NWRM	Natural Water Retention Measures
OPW	Office of Public Works (the Competent Authority)
PFRA	Preliminary Flood Risk Assessments
PoM	Programme of Measures
RBD	River Basin District
RBMP	River Basin Management Plan
SEA	Strategic Environmental Assessment
SuDS	Sustainable Drainage Systems
SUDS	Sustainable Urban Drainage Systems
UoM	Unit of Management
WFD	Water Framework Directive
WISE	Water Information System for Europe
WPAC	Water Policy Advisory Committee

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Introduction

The Floods Directive (FD) (2007/60/EC) requires each Member State to: assess its territory for significant risk from flooding; map the flood extent; identify the potential adverse consequences of future floods on human health, the environment, cultural heritage and economic activity in these areas; and to take adequate and coordinated measures to reduce this flood risk. By the end of 2011, Member States had to prepare Preliminary Flood Risk Assessments (PFRAs) to identify the river basins and coastal areas at risk of flooding (Areas of Potential Significant Flood Risk – APSFRs). By the end of 2013, they had to draw up Flood Hazard & Risk Maps (FHRMs) for such areas and, on this basis, prepare Flood Risk Management Plans (FRMPs) by the end of 2015.

This report assesses the FRMPs for Ireland (IE)[1], based on a common assessment template used for all Member States. The report draws on two main sources:

- The Member State's reports to the European Commission on the FRMPs, in line with Articles 7 and 15 of the FD. These reports provide an overview of the plans and details of their measures[2].
- Selected FRMPs: due to the high number of FRMPs prepared in Ireland, the assessment has focused on a selected set of plans, chosen to cover a range of geographical conditions and flood types. The following FRMPs were reviewed:
    - GBNIIENW (North Western), shared with the United Kingdom (Northern Ireland), with risk of pluvial flooding.
    - IE09 (Liffey and Dublin Bay), covering Dublin, the largest city, and risks of fluvial, coastal and pluvial flooding.
    - IE19 (Lee, Cork Harbour and Youghal Bay), covering the city of Cork and risks of fluvial and coastal flooding.

[1] The present Member State assessment report reflects the situation as reported by Ireland to the Commission in 2018 and refer to FRMPs prepared earlier than the reporting date. The situation in the Member State may have altered since then.

[2] Referred to as 'Reporting Sheets' throughout this report; data must be reported in a clear and consistent way by all Member States. The reporting format was developed jointly by the Member States and the Commission as part of a process called the 'Common Implementation Strategy': http://ec.europa.eu/environment/water/water-framework/objectives/implementation_en.htm
While a key role of the Commission is to check compliance with EU legislation, it also seeks information to determine whether existing policies are adequate. Furthermore, it requires certain information to create a Europe-wide picture to inform the public.

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- IE25-26 (Shannon Upper & Lower), the FRMP with the highest number of APFSRs, all facing fluvial flood risks (and one also facing coastal flood risks). Moreover, a small part of the UoM is situated in the United Kingdom (Northern Ireland).
- IE32-33 (Erriff-Clew Bay - Blacksod-Broadhaven), with fluvial and coastal flood risks.

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Overview

Figure 1 Map of Units of Management/River Basin Districts[3]

Units of Management/International River Basin Districts (within the European Union)
Units of anagement/International River Basin Districts (outside the European Union)
National River Basin Districts (within the European Union)
Countries (outside the European Union)
Coastal waters

Source: WISE, Eurostat (country borders)[4]

Ireland has reported on 29 UoMs, which are different from the eight River Basin Districts (RBDs) under the Water Framework Directive (WFD) for the first RBMP cycle. It is worth noting that some UoMs appear to have been merged (e.g. UoM 32-33, merged in 2014); however, these UoMs have a single FRMP and have been treated as a single UoM.

The FRMPs that have been assessed all follow the same outline and have standard (common) text. They were prepared as part of the national catchment flood risk assessment and management (CFRAM) programme.

[3] Note: These are based on shape files reported to WISE in 2018, which do not show all the individual UoMs.

[4] The UK was a Member State of the EU at the time Ireland drafted its FRMPs.

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The CFRAM programme also identified and mapped existing and potential future flood hazards and flood risks in the areas for further assessment (AFAs)[5], and identified viable structural and non-structural options and measures for effective and sustainable management of flood risk in the AFAs[6]. The programme is being implemented by the Office of Public Works (OPW).

The FRMPs were prepared by OPW and approved by the Minister for Finance and Public Expenditure and Reform[7]. It is not clear when they were approved at government level.

The table below gives an overview of all UoMs in Ireland, including the UoM code, the name, and the number of APSFRs[8] reported. It also shows if all the documents required for the UoM were sent to the European Environment Agency's (EEA) WISE[9] – this includes the FRMP as a PDF and the reporting sheet as an XML. It is worth noting that IEGBNISH (Shannon RBD) and GBNIIENW (North Western) each have a single XML covering the whole RBD, even though the RBDs are made up of multiple UoMs; each of these UoMs have reported a single FRMP.

Table 1 Overview of UoMs in Ireland

UoM	Names	Number of APSFRs	XML reported	PDF reported
IE01	NORTH WESTERN	26	See GBNIIENW	Yes
IE07	BOYNE	11	Yes	Yes
IE08	NANNY-DELVIN	13	Yes	Yes
IE09	LIFFEY AND DUBLIN BAY	24	Yes	Yes

[5] Areas for further assessment (AFAs) are Areas of Potential Significant Flood Risk (APSFRs). The terms AFA and APSFR are both used throughout this report.

[6] All assessed FRMPs, section 1.3.3. 'The "CFRAM" Programme'.

[7] The Office of Public Works, 2018. 'A Report on Measures in Place and Proposed to Address Ireland's Flood Risk', Ireland. https://www.floodinfo.ie/static/floodmaps/docs/key_messges_page/Implementing_the_Gov_Nat_Flood_Risk_Policy_WEB.pdf

[8] For the first reporting cycle, 300 APFSRs were reported in the FRMPs (i.e. the FRMPs covered by this report); for the second cycle, 101 communities previously designated as APSFRs are no longer designated as such for formal FD reporting purposes. Thus, 199 communities are still designated as APSFRs in Ireland in the second cycle, with no new APSFRs being designated in this cycle. For information on the APFSRs in the second cycle, please see 'The Review of the National PFRA', 2019: https://www.gov.ie/pdf/?file=https://assets.gov.ie/46527/725059a026c744f0b91cecd0e89e1e39.pdf#page=1

[9] https://rod.eionet.europa.eu/obligations/603/deliveries?id=603&tab=deliveries&d-4014547-p=1&d-4014547-o=2&d-4014547-s=3

UoM	Names	Number of APSFRs	XML reported	PDF reported
IE10	AVOCA-VARTRY	11	Yes	Yes
IE11	OWENAVORRAGH	3	Yes	Yes
IE12	SLANEY + WEXFORD HARBOUR	7	Yes	Yes
IE13	BALLYTEIGUE-BANNOW	1	Yes	Yes
IE14	BARROW	14	Yes	Yes
IE15	NORE	11	Yes	Yes
IE16	SUIR	20	Yes	Yes
IE17	COLLIGAN-MAHON	4	Yes	Yes
IE18	BLACKWATER (MUNSTER)	9	Yes	Yes
IE19	LEE, CORK HARBOUR AND YOUGHAL BAY	16	Yes	Yes
IE20	BANDON-ILEN	6	Yes	Yes
IE21	DUNMANUS-BANTRY-KENMARE	4	Yes	Yes
IE22	LAUNE-MAINE-DINGLE BAY	7	Yes	Yes
IE23	TRALEE BAY – FEALE	7	See IEGBNISH	Yes
IE24	SHANNON ESTUARY SOUTH	13	See IEGBNISH	Yes
IE25-26	SHANNON UPPER AND LOWER	39	See IEGBNISH	Yes
IE27-28	SHANNON ESTUARY NORTH & MAL BAY	8	See IEGBNISH	Yes
IEGBNISH	SHANNON	See IE23-28	Yes	See IE23-28
IE29	GALWAY BAY SOUTH EAST	5	Yes	Yes
IE30	CORRIB	6	Yes	Yes
IE31	GALWAY BAY SOUTH EAST	1	Yes	Yes
IE32-33	ERRIFF-CLEW BAY – BLACKSOD-BROADHAVEN	5	Yes	Yes
IE34	MOY & KILLALA BAY	6	Yes	Yes
IE35	SLIGO BAY	9	Yes	Yes

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UoM	Names	Number of APSFRs	XML reported	PDF reported
IE36	ERNE	5	See GBNIIENW	Yes
GBNIIENB	NEAGH BANN	9	Yes	Yes
GBNIIENW	NORTH WESTERN	See IE01 and IE36	Yes	See IE01 and IE36
TOTAL		300	29/29	29/29

The FRMPs can be downloaded from the following web page of the Irish government: https://www.floodinfo.ie/map/floodplans/

Overview of the assessment

Table 2 below gives an overview of the evidence found during the assessment of the FRMPs. The following categorisation was used for the column on evidence:

- **Evidence to the contrary:** An explicit statement was found stating that the criterion was not met.
- **No evidence:** No information found to indicate that the criterion was met.
- **Some evidence:** Reference to the criterion is brief and vague, without a clear indication of the approach used for the criterion. Depending on the comment in the adjacent column, 'some evidence' could also be construed as 'weak evidence'.
- **Strong evidence:** Clear information provided, describing an approach followed in the FRMP to address the criterion.

Table 2 Overview of the evidence found during the assessment of the FRMPs

Criterion	Evidence	Comments
FRM objectives have been established	Strong evidence	An overall objective, 15 more detailed objectives and 18 sub-objectives have been set at national level. These common objectives for all FRMPs are tailored to local conditions through 'local weightings' which consider the relevance of each sub-objective at catchment/APSFR level.
FRM objectives relate to...		
...the reduction of potential adverse consequences	Strong evidence	The common overall objective for all FRMPs calls for the reduction of the potential consequences of flooding.
...the reduction of the likelihood of flooding	Some evidence	Six of the 15 detailed objectives refer to the reduction of flood risks. Flood risk encompasses the likelihood of flooding, though this term is not used in the objectives themselves[10].
...non-structural initiatives	No evidence	The objectives do not specifically refer to non-structural initiatives, although non-structural measures are set out in the FRMPs[11].
FRM objectives consider relevant potential adverse consequences to...		
...human health	Strong evidence	The overall objective refers to managing and reducing consequences of flooding to human health. Moreover, the first objective refers to minimising

[10] Ireland subsequently noted that the FD calls for objectives to include the reduction of the likelihood of flooding 'if considered appropriate'.

[11] Ireland subsequently noted that the FD calls for objectives to include non-structural initiatives 'if considered appropriate'.

Criterion	Evidence	Comments
		risk to human health and life.
...economic activity	Strong evidence	The overall objective refers to managing and reducing consequences of flooding to economic activity. One objective refers to minimising economic risk (and others to minimising risk to transport infrastructure, to utility infrastructure and to agriculture).
...environment	Strong evidence	The overall objective refers to managing and reducing consequences of flooding to the environment. More detailed objectives concern potential adverse consequences to specific environmental components, such as damage to flora and fauna.
...cultural heritage	Strong evidence	The overall objective refers to managing and reducing consequences of flooding to cultural heritage. One more detailed objective refers to avoiding damage to cultural heritage.
Measures have been...		
...identified	Strong evidence	Ireland has reported 601 measures across all its UoMs. These measures cover three of the four aspects of flood risk management: protection, prevention, and preparedness; Ireland explained that recovery and review measures were reported as preparedness measures[12]. The FRMPs explain that the objectives were used to identify measures and also note that some measures are still being developed.
...prioritised	Some evidence	The assessed FRMPs state that the measures have been prioritised based on budget. However, there is no indication as to how this approach works in practice, and no information was reported in the reporting sheets.
Relevant aspects of Article 7 have been taken into account, such as...		
...costs & benefits	Strong evidence	Economic costs and benefits were considered in the screening and selection of measures. The FRMPs explain that two methodologies were used for selection, either an economic benefit-cost ratio or a benefit-cost ratio using the results of multi-criteria analysis.

[12] Moreover, Ireland explained that its national categories include the combined aspect of 'preparedness and resilience'.

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Criterion	Evidence	Comments
...flood extent	Strong evidence	The assessed FRMPs show that flood extent, as indicated in flood hazard and risk mapping, was used to identify possible measures.
...flood conveyance	Strong evidence	Flood conveyance is addressed through measures at national level. At local level, they are considered part of preparing the preliminary option reports[13].
…water retention	Strong evidence	Water retention is addressed through national-level measures, including sustainable urban drainage. Local authorities are also encouraged to use NWRM in local urban planning. At local level, preliminary option reports also consider water retention.
...environmental objectives of the WFD	Strong evidence	One of the 15 specific objectives refers to the WFD's objectives. Using this floods-related objective, potential measures are evaluated for their impact on the WFD's environmental objectives. This evaluation contributes to an overall score which determines whether a measure will be implemented.
...spatial planning/land use	Strong evidence	All FRMPs include national-level measures for spatial planning and land use. These measures call on local authorities to address flood risks in their spatial planning.
...nature conservation	Strong evidence	The floods-related objectives found in all assessed FRMPs include supporting the objectives of the Habitats Directive and avoiding damage to (and, where possible, enhancing) flora and fauna. Sub-objectives include avoiding damage and enhancing Natura 2000 areas and maintaining/improving conditions that allow upstream migration for fish species. These floods-related objectives are then used in the evaluation of potential measures.
...navigation/port infrastructure	Strong evidence	One objective, found in all assessed FRMPs, refers to minimising risk to transport infrastructure. In these FRMPs, two proposed community-level measures refer to port infrastructure (notably in the FRMP for IE25-26, Shannon Upper & Lower, which covers the Limerick Port Area).
...likely impact of climate change	Strong evidence	The assessed FRMPs refer to coordination with Ireland's national adaptation framework and with sectoral and local adaptation plans. One common

[13] https://www.floodinfo.ie/publications/?t=21

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Criterion	Evidence	Comments
		objective refers to future flood risk and the potential impacts of climate change: consequently, potential measures are evaluated for their ability to adapt in the future, specifically with regard to climate change. Moreover, these FRMPs identify potential changes to the climate, and identify whether each APSFR is at low, medium, or high risk of future impacts.
Coordination with other countries ensured in the RBD/UoM	Strong evidence	Coordination between the OPW and the former Northern Ireland Rivers Agency (now the Department for Infrastructure) took place through a cross-border coordination group and representatives of the Rivers Agency were members of the national CFRAM steering group. The North Western FRMP states that the Northern Ireland Rivers Agency was represented on the steering, progress and stakeholder groups for the North Western-Neagh Bann CFRAM study that preceded the preparation of the FRMP. The Rivers Agency participated in information activities with OPW, including joint presentations to stakeholders and jointly attending relevant consultation events. In the Shannon Upper and Lower FRMPs, the Rivers Agency is also represented on the Shannon CFRAM steering group, although the UK part of the UoM is minor.
Coordination ensured with WFD	Strong evidence	The assessed FRMPs give details of coordination mechanisms between national authorities responsible for flood risk management and those that implement the WFD. As noted above, potential measures must consider their impact on the WFD objectives.
Active involvement of interested parties	Strong evidence	Both national and regional stakeholder groups were set up in Ireland. The national CFRAM stakeholder group allowed for ongoing engagement with key non-governmental stakeholder organisations in all the key stages during implementation of the national CFRAM programme[14] (all FRMPs, section 4.3.2). The regional groups were set up to engage with local non-governmental stakeholder organisations at key stages during implementation of the regional CFRAM projects. Of particular note are the regional progress groups, which met approximately every 6 weeks.

[14] FRMP section 4.3.2: IE01 page 34; IE09 page 41; IE19 page 38; IE25-26 page 38; IE32-33 page 29.

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Good practices

The assessment identified the following good practices in the assessed FRMPs.

Table 3 Good practices in the Irish FRMPs

Topic area	Good practices identified
Integration of previously reported information in the FRMPs	Public consultation was used to verify modelling outputs on which the FHRMs were based. This took into account local knowledge, which either agreed or disagreed with the draft mapping, in updating models to better represent flood hazard and risk.
Setting of objectives for the management of flood risk	A national consultation was carried out to help set flood risk objectives. The methodology for the objectives is clearly set out in the supporting documents. The objectives include minimising health and safety risks in constructing, operating and maintaining measures, as well as adapting to potential impacts of climate change. Sub-objectives include avoiding damage and enhancing Natura 2000 areas and maintaining/improving conditions that allow upstream migration for fish species. The use of a system of local weightings for the objectives indicates the relevance of each objective within the catchment; this system is then used in selecting measures. Indicators and targets have been identified for the objectives; however, this information is found in supporting documents rather than the FRMPs themselves. The methodologies used to select options for measures at national and local level, based on the objectives, are clearly described in the supporting documents.
Planning/implementing of measures and prioritising them to achieve the objectives	The selection of measures is assessed against the objectives, including objectives for the WFD and Habitats Directive and climate considerations. The assessed FRMPs clearly set out the total funding for flood risk management activities and also identified the costs of many (though not all) of their measures. Non-structural and NWRMs have been identified, although mostly at national level (e.g. common planning and local adaptation measures for all FRMPs). Public consultations were carried out on proposed flood management options (the FRMPs refer to options as single possible measures or groups of possible measures). The FRMP objectives, together with institutional coordination mechanisms and methods to select and assess measures, all establish clear links between the WFD and the Floods Directive. The assessed FRMPs set out procedures for their review, including the review of environmental indicators identified under their SEAs.
Consideration of climate change in the assessed FRMPs	Climate change plays a large role in the FRMPs, which are linked to the national adaptation framework and include a specific objective (Objective 4.c.i) on adaptation. The FRMPs set out the potential impacts of climate change on flood risks. All assessed FRMPs have a measure (‘measure applicable for all areas’) requiring local authorities to consider climate change in their spatial planning

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Topic area	Good practices identified
	and the planning and design of infrastructure[15]. Each measure and potential measure includes an assessment of how it can be adapted in the future in response to climate change.
Use of CBA in the assessed FRMPs	Ireland has established a clear and detailed procedure for cost-benefit analysis, which was coordinated nationally to ensure a consistent approach in all UoMs. Environmental and social benefits are not considered in the cost-benefit analysis of measure options, but they are used (along with economic benefits) for a multi-criteria analysis (MCA) where these benefits are presented as scores and therefore not monetised. The MCA benefit score is divided by the cost of a particular measure or set of measures to provide a numerical, but non-monetised, MCA benefit-cost ratio; this provides an indication of the overall benefits that can be delivered per euro invested.
Public participation	Public consultations involved a wide range of stakeholders. Information was provided at national and regional level and via local public consultation days in all AFAs, as far as possible and appropriate. Over 200 local public consultation days were held across the country between 2013 and 2016[16]. Early and extensive stakeholder involvement was coordinated through national and regional steering and stakeholder groups. Regional progress groups were set up to ensure regular communication between key stakeholders and the CFRAM project and to support the successful implementation of the project and the preparation of the FRMPs. These groups met approximately every 6 weeks. A separate national report provided information about the written comments and recommendations from all the public consultations and indicated how they were taken into account in the finalisation of the FRMPs. OPW (the competent Authority) commissioned an independent poll of over 1 000 members of the public (it is assumed that this was conducted nationally). The poll used a structured questionnaire to explore views on the weightings to be given to each objective.
Flood risk governance	OPW established a national approach to consultation and engagement on the FRMPs, ensuring consistency in the stages that were followed and the methods used. This allowed for some variation between UoMs; for example, in the number of stakeholders participating in the CFRAM project stakeholder groups and the number of public consultation events held, as reflected in the FRMPs. This provided a balance between national consistency and local relevance.
International issues in flood risk management	Ireland has involved the competent authority in Northern Ireland (the Rivers Agency) in a range of coordination and stakeholder groups at national level and in the UoMs.

Areas for further development

The assessment identified the following areas for further development in the assessed FRMPs.

[15] All assessed FRMPs, section 7.4.1.4.

[16] FRMPs Figure 4.1: IE01 page 34; IE09 page 42; IE19 page 37; IE25-26 page 37; IE32-33 page 28.

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Table 4 Areas for further development in the Irish FRMPs

Topic area	Areas for further development identified
Integration of previously reported information in the FRMPs	No clear information was provided in any of the FRMPs on how the PFRAs were included in developing the FHRMs and the FRMPs. From the information provided, it appears that there was limited use of the PFRAs. While one FRMP (IE01, North Western) notes conveyance capacity issues as a potential fluvial flood risk, the other FRMPs do not mention conveyance routes in the context of the PFRAs. Consequently, it is not clear how conveyance routes were considered when describing past floods[17]. The FRMPs do not provide examples of the FHRMs in their main text or as annexes, though the plans contain internet links to the national webpage hosting the maps.
Setting of objectives for the management of flood risk	The documents reviewed do not provide a clear timeframe to achieve the objectives.
Planning/implementing of measures and prioritising them to achieve the objectives	No recovery and review measures have been identified in the reporting for any of the UoMs, although such measures do indeed exist (and have been reported as 'preparedness' measures). While one FRMP indicates that national authorities have coordinated with the insurance industry, no measures related to risk transfer have been identified in any of the five assessed FRMPs. Community-level measures have yet to be confirmed and developed. While work is ongoing to do this, there are no timeframes to either start or complete such measures.
Consideration of climate change in the assessed FRMPs	Most of the references to climate change adaptation are for measures that focus on infrastructure, mainly the raising of flood barriers.
Use of CBA in the assessed FRMPs	The approach to CBA did not include a broader consideration of benefits, for example via multi-benefit analysis. It focused on an economic appraisal, with the assessment being based on reducing economic damage and considering intangible and indirect damage[18].

[17] Ireland subsequently noted that the PFRA was preliminary and based only on available and readily derivable information. Ireland also stated that, apart from identifying the APSFRs, the PFRA feeds primarily into the preparation of the FHRM by providing information on past floods. Furthermore, Ireland stated that the process of producing the FHRM was much more detailed and robust than the PFRA and informs the FRMP on matters such as conveyance and water retention; hence, there is little information directly from the PFRA that can inform the preparation of the FRMPs.

[18] Ireland subsequently informed that a project to review the appraisal process, with a view to including a wider range of social, environmental and public benefits, was recently publicly advertised for tender (E-Tenders, 01/05/2020, External Reference: 2020-231511, TED Reference: 2020/S 088-210349).

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Topic area	Areas for further development identified
Public information and consultation	Provision of information, especially the online information made available to the public, appears to have relied on technical maps and documents which may be difficult for non-technical audiences to engage with[19].

Recommendations

Based on the information reported by Ireland and the assessed FRMPs, the following recommendations are made to enhance flood risk management (in no particular order):

- Ireland should prepare the next cycle of FRMPs in accordance with the FD timetable, to ensure timely adoption of the second FRMPs.
- The FRMPs could more clearly explain how the PFRAs were used to prepare the FHRMs and FRMPs, and provide further detail on conveyance routes.
- The objectives could more clearly indicate that they aim both to reduce the likelihood of flooding and to manage the consequences of flooding.
- The objectives could specifically refer to non-structural measures.
- Recovery and review measures should be clearly identified. The FRMPs could also go further in explaining the potential role of risk transfer in flood risk management.
- The FRMPs should clearly set out the timeframes for measures.
- The FRMPs could go further in assessing how all types of measures, including spatial planning and NWRM, can address climate change.
- A broader consideration of benefits - via multi-benefit analysis, for example - would add more value to the CBA by offering options for measures, rather than being based exclusively on an assessment of how to reduce economic damage.
- The provision of non-technical summaries and other non-technical information should be considered as a tool to ensure wide public and stakeholder engagement.

[19] Ireland subsequently noted that public consultation days were held in the relevant communities (Section 4.4. of the FRMPs) to provide for face-to-face meetings between the project team and the public and stakeholders. This was specifically intended to explain technical concepts, maps, and documents to the public and stakeholders.

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1. Scope of the assessment and sources of information for the assessment

1.1 Reporting of the FRMP

Ireland has reported for all 29 UoMs. However, information was only reported in mid-2018, making the submission late: the FRMPs were to be published by December 2015 and reported by March 2016 to the European Commission. This meant that the Irish FRMPs could not be assessed as part of the European Commission's assessment of the EU FRMPs published in 2019. This assessment has been prepared separately.

Ireland did not make use of Article 13.3 of the Floods Directive, which allows Member States to make use of previous flood risk management plans (provided their content is equivalent to the requirements set out in the Directive).

Concerning the geographic coverage of the FRMPs, each FRMP corresponds to one entire UoM, except for three FRMPs that each cover two UoMs. Ireland merged two UoMs (IE32 and IE33) in 2014 and re-reported them to the Commission on 21 March 2014. A reason for this merge has not been provided in the FRMP or in information reported to the EIONET CDR, however it was stated that UoM IE33 had no designated APSFRs.

1.1 Assessment of the FRMP

Based on the characteristics of the UoMs (as reported in the PFRAs and FHRMs), the following FRMPs were identified for assessment:

- GBNIIENW (North Western)[20]: Shared with the United Kingdom (Northern Ireland); more APSFRs than Neagh Bann or Erne; 1 APSFR has risk of pluvial flooding.
- IE09 (Liffey and Dublin Bay): Includes Dublin; fluvial, coastal, pluvial flood sources present.
- IE19 (Lee, Cork Harbour and Youghal Bay): Includes Cork; fluvial and coastal flood sources.
- IE25-26 (Shannon Upper & Lower): Largest UoM, largest number of APSFRs. All APSFRs face fluvial flood sources; one has both fluvial and coastal flood sources.
- IE32-33 (Erriff-Clew Bay - Blacksod-Broadhaven): fluvial and coastal flood sources

[20] The FRMP for this UoM is also referred to as FRMP 01 North Western, in line with Irish reporting to WISE.

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Table 5 Irish UoMs assessed

UoM code	UoM Name
GBNIIENW	North Western
IE09	Liffey and Dublin Bay
IE19	Lee, Cork Harbour and Youghal Bay
IE25-26	Shannon Upper & Lower
IE32-33	Erriff-Clew Bay - Blacksod-Broadhaven

2. Integration of previously reported information

2.1 Conclusions drawn from the preliminary flood risk assessment

Section 3 of each of the FRMPs assessed is dedicated to the PFRA, providing a short overview of how the PFRA was undertaken along with the outcomes of the PFRA indicating the number of APSFRs that were designated around Ireland. An appendix to the FRMP provides a more detailed summary of how the PFRA was undertaken in Ireland.

Each of the FRMPs includes a map of the UoM showing the locations of potential significant flood risk (referred to in Ireland as Areas for Further Assessment, AFAs[21]).

All flood risk areas were identified through the national PFRA as Article 13 was not applied in Ireland.

As well as a map of AFAs within the relevant UoM, each FRMP contains a textual description of the AFAs in the form of a table which provides the names and source(s) of flood risks of each. A separate appendix (Appendix C) in each of the FRMPs also provides further information on how the PFRA was undertaken and makes reference to the Main Report of the PFRA and the Report on the Designation for Areas for Further Assessment which are both available from the OPW website[22].

The FRMPs of two international UoMs have been assessed. In the FRMP 25-26 Shannon Upper and Lower it is stated that there are no international APSFRs, consequently there is no need for a summary map showing international APSFRs shared with other international UoMs. In FRMP 01 North Western it is not explicitly stated whether or not international APSFRs have been designated, however examination of the map provided in the FRMP suggests that no international APSFRs have been designated and therefore there is no need for a summary map showing international APSFRs.

In all FRMPs a reference is provided to the OPW's national flood information portal where interactive maps of AFAs can be found[23].

[21] This report uses both terms, AFAs (Areas for Further Assessment) and APSFRs (Areas of potentially significant flood risk).

[22] http://www.floodinfo.ie/

[23] http://www.floodinfo.ie/

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In the FRMP for IE01, North Western, conveyance capacity issues are highlighted as a potential fluvial flood risk in the summary of historical floods (Section 2.5). In the other FRMPs conveyance routes are not mentioned in the context of the PFRAs[24]. Ireland's national flood information site includes a detailed online drainage map; this information is not, however, clearly set out in the FRMPs assessed.

2.1.1 Coordination with neighbouring Member States on shared RBDs/UoMs

IE01 North Western is an international UoM shared with the UK. Section 4.5 of the FRMP outlines how the implementation of the FD was coordinated across the border. The FRMP specifies that the Rivers Agency (the relevant Competent Authority in Northern Ireland) was consulted directly on the potential cross border impacts associated with the transboundary watercourses[25].

As noted above, the FRMPs do not state whether or not any cross-border ASPFRs have been designated; however, the map of AFAs within the North Western River Basin does not show any cross border APSFRs.

IE25-26, Shannon Upper and Lower, is also an international UoM with a small portion of the Shannon catchment (2.5 km^2) in Northern Ireland. The FRMP for IE25-25 states that no significant flood risk issues exist within this area; consequently, it was felt that there was limited need for coordination; the FRMP does not specify if there was any coordination at the PFRA stage. Nonetheless, the Northern Ireland (NI) Rivers Agency is a member in the Shannon Steering Group and the FRMP states that the Agency is kept informed on progress and activities through the Cross-Border Coordination Group and the Cross-Border Technical Coordination Group.

2.1.2 Information how the PFRA was used in the development of the FHR maps

No clear information has been provided in any of the FRMPs regarding how the PFRA has been used in the development of the FHR maps.

[24] Conveyance is, however, mentioned in relation to existing flood risk management measures in the other four FRMPs assessment (FRMP 09, Liffey and Dublin Bay; FRMP 19, Lee, Cork Harbour and Youghal Bay) FRMP 25-26, Shannon Upper & Lower); and in each FRMP assessed, conveyance is listed among the flood protection measures typically considered.

[25] The FRMP notes that the Northern Ireland Rivers Agency was more generally involved in the preparation of the FRMP, including the development of measures, and moreover the Agency was represented in steering, progress and stakeholder groups of the CFRAM (National Catchment Flood risk Assessment and Management Programme): see section 7 for further details.

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In the FRMP 01 North Western, FRMP 09 Liffey and Dublin Bay, FRMP 19 Lee, Cork Harbour and Youghal Bay, and FRMP 25-26 Shannon Upper & Lower, it is stated that while the AFAs were determined though the PFRA, the flood hazard and flood risk analysis undertaken through the relevant CFRAM projects has been significantly more detailed compared to the analysis that was undertaken for the PFRA[26], suggesting that the PFRAs had a limited role in the development of the FHRMs.

All FRMPs mention the use of data from historical events to calibrate hydraulic and hydrological models during the analysis of flood hazard and risk[27], which were used in the creation of the flood hazard and risk maps, though it is not mentioned whether this data was utilized from the PFRA.

2.2 Presentation of Flood Hazard and Risk Maps (FHRMs) in the FRMPs

Examples of flood hazard and risk maps are not included within the FRMPs themselves though a link to their online versions is provided[28].

Flood hazard and risk maps have been provided online for AFAs at risk of fluvial and coastal flooding for the sources of flooding determined as being significant. The sources of flooding considered in the plans includes:

- fluvial (IE01 North Western, IE09 Liffey & Dublin Bay, IE19 Lee, Cork Harbour & Youghal Bay and IE25-26 Shannon Upper and Lower, IE32-33 Erriff – Clew Bay – Blacksod – Broadhaven),
- pluvial (IE01 North Western, IE09 Liffey & Dublin Bay, IE19 Lee, Cork Harbour and Youghal Bay),
- coastal (IE01 North Western, IE09 Liffey & Dublin Bay, IE19 Lee, Cork Harbour & Youghal Bay, IE23-26 Shannon Upper and Lower),
- tidal (IE25-26 Shannon Upper and Lower, IE32-33 Erriff – Clew Bay and Blacksod – Broadhaven)[29].

[26] FRMP 01 North Western Section 5.6, page 49; FRMP 09 Liffey and Dublin Bay Section 5.6, Page 48.

[27] All FRMPs assessed, section 5.1 and 5.2.

[28] Flood hazard and flood risk maps are available from www.floodinfo.ie

[29] Sources of flooding included in the FRMPS are stated in Section 1.5.2 in each FRMP assessed.

2.2.1 Maps for shared flood risk areas

As noted above, the two cross-border FRMPs assessed – for IE01 North Western and IE25-26 Shannon Upper and Lower – do not indicate that there any shared APSFRs with the United Kingdom, and no maps for shared APSFRs are presented.

2.2.2 Conclusions drawn from the flood hazard and flood risk maps

The FRMPs assessed provide links to the flood hazard and flood risk maps; however, these go to the OPW FloodInfo homepage, rather than to the maps themselves (though maps can be easily located from the homepage).

FHRMs have been used in the development of FRMPs for all UoMs assessed. The common, overall objective for all the FRMPs assessed refers directly to the 'sound understanding of the flood risk established through the preparation of flood maps' (see section 3).

The FRMPs assessed, moreover, list, among the functions of the Flood Hazard Mapping, that they provide tools for:

- Public participation,
- Planning and development management,
- Emergency response management,
- Flood risk management decision support.

Flood maps, and in particular various flood risk maps, are intended to be used as a decision support tool in the identification, planning, development, costing, assessment and prioritisation of flood risk management options, such as flood defence schemes, flood warning systems and public awareness campaigns.

All five FRMPs assessed, moreover, indicate (in Section 7.1) that the FHRMs were used in the process for identifying what flood risk management measures might be suitable for a given area or location, and then how the options for such measures were appraised to determine which options would be most effective and appropriate[30].

Mapping of future flood risks was also undertaken for two future scenarios to identify flood protection or other measures that might be required in the future, and how adaptable measures aimed at addressing existing risks would be to meet future needs[31]. Future scenarios considered potential future flood extents, depths and risks based on flood mapping undertaken for Mid-Range and High-End Future Scenarios (these two categories were assigned on the basis of

[30] This is also covered in sections 4.4.4 or 4.4.5 of all FRMPs assessed.

[31] All FRMPs assessed, section 7.3.3.

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defined levels of change in parameters such as peak flood flows, mean sea level rise and urbanisation[32].

A public consultation was undertaken in Ireland on the FHRM and the information obtained was used to verify hydraulic and hydrological modelling outputs, based on the degree to which participants presented local knowledge in agreement or disagreement with the draft mapping. As a result, many of the models were updated in order to better represent flood hazards and risks. In addition, the public consultations on flood maps were held to obtain ideas from the public about what they saw as potential solutions to flood problems in their area, and what was locally important to guide the weightings for the subsequent multi-criteria analysis (MCA[33]) to inform the prioritisation of measures.

Therefore, it can be concluded that based on the reporting sheets and the FRMPs:

- FHRMs were used to set priorities for flood risk management (e.g. locations, economic activities, assets);
- FHRMs were used as a tool in the public participation process;
- Specific objectives on flood risk reduction were defined based on the FHRM;
- Measures were defined based on the FHRM.

2.3 Changes to the APSFRs or other Flood Risk Areas

Any changes in the identification of Areas of Potential Significant Flood Risk since December 2011 should be reflected in the FRMP. The FRMPs confirm that the PFRA was finalised in December 2011, and they make no reference to any changes to APSFRs (AFAs) since that date.

In four of the five FRMPs assessed (the exception being the FRMP for IE32-33 Erriff-Clew Bay - Blacksod-Broadhaven), section 5.6[34] discusses AFAs of low risk. These areas were not changed. The FRMPs explain, however, that these AFAs were identified through the PFRA, but subsequent flood hazard and risk analysis was undertaken through the regional CFRAM projects. This analysis was more detailed than that undertaken for the PFRA and identified some AFAs as having a low level of flood risk. Consequently, the development of flood risk management measures has not been pursued in these AFAs[35].

[32] See Table 5.2 page 48 in the FRMP 01 North Western.

[33] All FRMPs assessed, section 7.3.6

[34] FRMP 01 North Western page 49; FRMP 09 Liffey and Dublin Bay page 58; FRMP 19 Lee, Cork Harbour and Youghal Bay page 48; FRMP 25-26 Shannon Upper & Lower page 53.

[35] The FRMPs do not, however, rule out that river basin level measures in these areas may still be relevant and applicable, and when considering planning and development management the potential for flooding in undeveloped areas needs to be considered in all AFAs including where existing risk is low.

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This applies to:

- 7 AFAs in FRMP 01 North Western,
- 4 AFAs in FRMP 09 Liffey and Dublin Bay,
- 1 AFA in FRMP 19 Lee, Cork Harbour and Youghal Bay,
- 15 AFAs in FRMP 25-26 Shannon Upper & Lower.

It is also mentioned that these AFAs will be reviewed, along with all areas, as part of the review of PFRAs.

No information was found in the FRMPs on whether any changes were made regarding the preparation of Flood Hazard and Flood Risk Maps since December 2013 (the Directive's deadline for the FHRMs). However, in each of the FRMPs it is stated that flood maps will be reviewed on an ongoing basis as new information becomes available (prior to the formal review in 2019).

2.4 Areas for further development in the earlier assessment of the flood hazard and risk maps

The FHRM assessment[36] prepared in 2014 identified the following substantive areas for further development for Ireland[37]:

- According to Art. 6(4)(b), Member States shall report for each probability scenario the flood extent and the water depths or level, as appropriate. Some UoMs do not show flood extent and water depth/level in their flood risk and hazard maps. The reasons for the non-inclusion of these elements in the flood hazard and flood risk maps were not reported. The IE authorities stated that this information would be made available "when reporting in full - provided on PDF maps".
- According to Art.6(5)(a), flood risk maps shall show the potential adverse consequences associated with the flood scenario in terms of number of inhabitants affected. Most but not all UoMs reported the number of inhabitants affected. The reasons for the non-inclusion of these elements in some of the flood hazard and flood risk maps were not explained. The IE authorities stated that this information would be made available "when reporting in full - provided on PDF maps".
- According to Article 6(5)(c), Member States should report potentially affected protected areas identified in annex IV (i) (iii) and (v) to Directive 2000/60/EC[38]. IE did

[36] European Commission, Assessment of Flood Hazard and Flood Risk Maps – Member State Report: IE - Ireland, 2014. Available at: https://ec.europa.eu/environment/water/flood_risk/pdf/fhrm_reports/IE%20FHRM%20Report.pdf

[37] Ireland informed that since this assessment was carried out, Ireland has reported its 2018 FHRMs, which have addressed the issues raised here.

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not report adverse consequences on the environment in the mapping of the risk from low probability floods. The reasons for the non-inclusion of these elements in the flood hazard and flood risk maps were not included.

- No numeric details were given of the maps associated with the APSFR so that they could be depicted on a European map of flooding.

The FHRM schemas for electronically reporting/making information available to the Commission for IE were filled in at a very basic level with some information left out.

While these areas for further development identified in the earlier assessment of the FHRMs are not explicitly addressed within the FRMPs assessed or the reporting, a selection of flood maps from the five FRMPs assessed were checked. This review has found the following:

- All the flood maps checked contained flood extent and flood depth for high, medium and low probability scenarios[39].
- All the maps checked contained potential adverse consequences associated with the flood scenario in terms of number of inhabitants affected for high, medium, and low probability scenarios[40].
- For all the flood maps checked, a PDF map has been provided showing 'general risk' to the environment in terms of flood extent for the different scenarios, with locations of important sites shown (e.g. abstractions, Special Areas of Conservation/Special Protection Areas[41]); however, adverse consequences on the environment in the mapping of the risk from low probability floods have not been reported.
- In all of the maps assessed, scale bars are provided.

2.5 Good practices and areas for further development in the FRMPs regarding integration of previously reported information

The following **good practice** was identified:

- Public consultation was used to verify modelling outputs on which the FHRMs were based: local knowledge in agreement or disagreement with the draft mapping was considered in the update of models to better represent flood hazard and risk.

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[38] These points refer to areas for the abstraction of drinking water, for nutrient sensitive areas under the Nitrates Directive and to Natura 2000 sites designated under the Birds and Habitats Directives.

[39] Flood maps are provided for AFAs as PDFs and are available at: http://www.floodinfo.ie/map/floodmaps/ . Please note not all flood maps were assessed. Separate PDFs are provided for each scenario and consequence.

[40] Flood maps are provided for AFAs as PDFs and are available at: http://www.floodinfo.ie/map/floodmaps/ . Please note not all flood maps were assessed. Separate PDFs are provided for each scenario and consequence.

[41] Special Area of Conservation and Special Protection Areas are designated under Directive 92/43/EEC (Habitats Directive) and Directive 2009/147/EC (Birds Directive), respectively.

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The following **areas for further development** were identified:

- No clear information was provided in any of the FRMPs on how the PFRAs were employed in the development of the FHRMs and the FRMPs: from the information provided it appears that there was limited use of the PFRA.
- While one FRMP (for IE01, North Western) notes conveyance capacity issues as a potential fluvial flood risk, the other FRMPs do not mention conveyance routes in the context of the PFRAs – consequently, it is not clear if conveyance routes were considered as part of the description of past floods.
- The FRMPs do not provide any examples of the FHRMs in their main text or as annexes, though the plans contain internet links to the national webpage which hosts the maps.

3. Setting of Objectives

3.1 Focus of objectives

The overall objective of the five FRMPs assessed is to "manage and reduce the potential consequences of flooding, recognising other benefits and effects across a broad range of sectors including human health, the environment, cultural heritage and economic activity, through viable flood protection schemes and other measures informed by a sound understanding of the flood risk established through the preparation of flood maps"[42]. The focus of the overall objective is thus on protection, rather than reducing the probability of floods or flood adaptation[43].

Fifteen more detailed objectives are also included, categorised in terms of 4 criteria and split into 18 sub objectives[44]:

Criteria	Objectives	Sub Objectives
1) Social	a) Minimise risk to human health and life	i) Minimise risk to human health and life of residents
		ii) Minimise risk to high vulnerability properties
	b) Minimise risk to community	i) Minimise risk to social infrastructure and amenity
		ii) Minimise risk to local employment
2) Economic	a) Minimise economic risk	i) Minimise economic risk
	b) Minimise risk to transport infrastructure	i) Minimise risk to transport infrastructure
	c) Minimise risk to utility infrastructure	i) Minimise risk to utility infrastructure
	d) Minimise risk to agriculture	i) Minimise risk to agriculture
3) Environmental	a) Support the objectives of the WFD	i) Provide no impediment to the achievement of water body objectives and, if possible, contribute to the achievement of water body objectives.
	b) Support the objectives of the Habitats Directive	i) Avoid detrimental effects to, and where possible enhance, Natura 2000 network, protected species and their key habitats, recognising relevant landscape features and stepping stones.
	c) Avoid damage to, and where possible enhance, the	i) Avoid damage to or loss of, and where possible enhance, nature conservation sites and protected species or other

[42] All FRMPs assessed, Executive Summary "Objectives of the Plan".

[43] Ireland subsequently noted that the FD calls for objectives to include the reduction of the likelihood of flooding "if considered appropriate".

[44] All FRMPs assessed, section 1.4.2, table 1.2.

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Criteria	Objectives	Sub Objectives
	flora and fauna of the catchment	known species of conservation concern.
	d) Protect, and where possible enhance, fisheries resource within the catchment	i) Maintain existing, and where possible create new, fisheries habitat including the maintenance or improvement of conditions that allow upstream migration for fish species.
	e) Protect, and where possible enhance, landscape character and visual amenity within the river corridor	i) Protect, and where possible enhance, visual amenity, landscape protection zones and views into / from designated scenic areas within the river corridor.
	f) Avoid damage to or loss of features, institutions and collections of cultural heritage importance and their setting	i) Avoid damage to or loss of features, institutions and collections of architectural value and their setting.
		ii) Avoid damage to or loss of features, institutions and collections of archaeological value and their setting.
4 Technical	a) Ensure flood risk management options are operationally robust	i) Ensure flood risk management options are operationally robust
	b) Minimise health and safety risks associated with the construction, operation and maintenance of flood risk management options	i) Minimise health and safety risks associated with the construction, operation and maintenance of flood risk management options
	c) Ensure flood risk management options are adaptable to future flood risk, and the potential impacts of climate change	i) Ensure flood risk management options are adaptable to future flood risk, and the potential impacts of climate change

Each sub-objective is given a "global weighting", and "local weightings" assigned on catchment/AFA level (sub-UoM level), based on public consultations: these weightings are then used in the multi-criteria analysis of measures (see section 6 for further details)[45].

The CFRAM Technical Methodology Note on Option Appraisal and the Multi-Criteria Analysis (MCA) Framework[46] sets out the selection methodology and weightings of each objective, including an assessment of the social, environmental, and economic considerations.

[45] All FRMPs assessed, section 7.3.4, section 7.3.4.1.

[46] This document was not uploaded to WISE as part of Ireland's reporting, but is referred to in the FRMPs assessed.

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The Preliminary Option Reports[47], prepared for each UoM, list the local weightings and the methodology used at local level.

Based on the information found in the FRMP[48]:

- The objectives aim to reduce the adverse consequences of floods[49];
- The objectives call for risk reduction but do not specifically address the likelihood of flooding[50] (see section 3.5 below);
- The objectives do not refer to measures that will be implemented;
- The objectives do not refer specifically to non-structural measures[51];
- The objectives do not aim to coordinate flood risk with neighbouring countries (e.g. to ensure that measures taken do not increase flood risk in neighbouring countries)[52].

3.2 Specific and measurable objectives

Whilst the Reporting Sheets state that "The Objectives have been set up to be specific and measurable, in so far as is practicable"[53] there is no further information in the FRMPs assessed, beyond the text of the objectives, on how they do so. However, the FRMPs assessed refer to the CFRAM Technical Methodology Note on Option Appraisal and the Multi-Criteria Analysis (MCA) Framework. In this Note, each objective is described in detail, including how the Objective is to be applied at local level. Furthermore, for each objective appropriate indicators, basic targets, and "aspirational targets" are set out. The Technical Methodology Note states that it is not expected that the aspiration target is achieved for all objectives, while the basic requirement is to be considered as a benchmark against which impacts and progress can be

[47] It is also worth noting that Appendix G sets out the local weightings relevant for each potential flood management option.

[48] These categories are included in Art. 7 of the Floods Directive.

[49] This is emphasised in the overall objective but not mentioned explicitly in the Social and Economic objectives.

[50] The assessment adopts the generally accepted definition of risk as a product of consequence times likelihood, thereby also in alignment with Art. 7(2) of the FD. Ireland subsequently noted that the FD states that the objectives are to cover the likelihood of flooding "where appropriate".

[51] Non-structural measures include measures such as flood forecasting and raising awareness of flooding as well as land use planning, economic instruments and insurance. Ireland subsequently noted that the FD states that the objectives are to refer to "non-structural initiatives" only "where appropriate". Ireland's FRMPs include non-structural measures, even if the objectives do not make reference to them. In the CFRAM Technical Methodology Note on Option Appraisal and the Multi-Criteria Analysis (MCA) Framework, each objective is also to be considered with regard to "Non-Structural Option Risk Reduction" when setting weightings.

[52] Ireland subsequently noted that transboundary coordination, while not integrated into the objectives, is a governance and procedural matter. Transboundary coordination is nonetheless included in the FRMPs assessed where relevant.

[53] Reporting Sheets, Summary of the Objectives.

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measured[54]. The Preliminary Option Reports, prepared for each UoM, include further information, including the designation of the local weightings.

There are no specific locations set out for the objectives; however, it is clear that the objectives can be adapted to cover individual APSFRs via the system of local weightings. It is assumed that these local weightings are designed so that all (relevant) objectives are applied in all APSFRs. The location of the objectives can thus be at least indirectly provided. However, the objectives do not refer to a timeframe for their achievement[55].

As noted above, numerical weightings are assigned to the objectives at sub-UoM level as part of the multi-criteria analysis for measures. This includes the identification of specific indicators[56] As noted above, these are set out for each objective in a common national document, the CFRAM Technical Methodology Note on Option Appraisal and the Multi-Criteria Analysis (MCA) Framework, and in the Preliminary Option Reports for each UoM. In only two of the five FRMPs assessed – FRMP 01 North Western and FRMP 09 Liffey and Dublin Bay –are indicators set out for monitoring[57]; however, these FRMPs do not provide the targets identified at national level.

The individual local weightings for each APSFR/community are not systematically set out in any of the FRMPs but are instead listed in the separate Preliminary Option Reports. Local weightings are used to describe the preliminary measures set out in Appendix G of the FRMPs.

In conclusion, while the FRMPs for the most part do not provide information to make the objectives specific or measurable, the CFRAM Technical Methodology Note on Option Appraisal and the Multi-Criteria Analysis (MCA) Framework provides detailed information on how the objectives are to be measured, both with regard to indicators and targets. Furthermore, the Framework sets out how local weightings are to be calculated; the results of these calculations (i.e. the individual local weightings for each APSFR) are available in the Preliminary Option Reports prepared for each UoM[58].

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[54] CFRAM Technical Methodology Note on Option Appraisal and the Multi-Criteria Analysis (MCA) Framework, p. 9

[55] Ireland subsequently informed that the funding of the measures set out in the FRMPs is derived from the National Development Plan 2018-2027 that sets the intended timeframe for delivery.

[56] Reporting Sheets, Summary of the Objectives, and listed in the CFRAM Technical Methodology Note on Option Appraisal and the Multi-Criteria Analysis (MCA) Framework.

[57] FRMP 01 North Western and FRMP 09 Liffey and Dublin Bay, section 8.3 and 8.4, table 8.1.

[58] https://www.floodinfo.ie/publications/?t=21, although noted that the FRMPs direct the reader to the Floodsinfo.ie homepage.

3.3 Objectives to reduce adverse consequences from floods

According to the FRMPs, the overall objective of the FRMPs is to "manage and reduce the potential consequences of flooding, recognising other benefits and effects across a broad range of sectors including human health, the environment, cultural heritage and economic activity, through viable flood protection schemes and other measures informed by a sound understanding of the flood risk established through the preparation of flood maps"[59]. Objectives thus focus on minimising and avoiding adverse consequences[60].

The objectives are split into Social, Economic, Environment, and Technical objectives. Although no quantitative reductions are specified, it is specifically stated that social infrastructure, consequences on human health, cultural heritage, the environment, and economic activity should be minimised (or in some cases, avoided).

3.4 Objectives to address the reduction of the likelihood of flooding

Ireland has set a strategic objective for reducing risk (which includes the likelihood of flooding).

The specific objectives do not specifically address the reduction of the likelihood of flooding, although there are measures in place to achieve this effect thus indicating that reducing the likelihood of flooding has been considered[61]. Furthermore, "technical" objectives have been identified – to ensure flood risk management options are operationally robust, health and safety risks associated with the construction, operation and maintenance of flood risk management options are minimised, and flood risk management options are adaptable to future flood risk, and the potential impacts of climate change – neither these nor other objectives specifically refer to reducing flood risk itself.

3.5 Process for setting the objectives

The objectives are the same in all FRMPs, and it is stated that these were developed as part of the National Catchment Flood Risk Assessment and Management (CFRAM) Programme and were subject to public consultation in 2014[62].

[59] All FRMPs assessed, Executive Summary.

[60] All FRMPs assessed, section 1.4.2, table 1.2.

[61] Ireland subsequently noted that the FD calls for objectives to include the reduction of the likelihood of flooding "if considered appropriate".

[62] All FRMPs assessed, section 1.4.2.

Objective 4.c considers the adaptability of flood risk management options with regard to climate change, although the other objectives do not explicitly consider how climate change may impact the risk of flooding (see section 6 for further details).

Consequently:

- Objectives have been coordinated at national level.
- The potential effects of climate change on the risk of flooding have been taken into account.
- The objectives were discussed with stakeholders before their establishment.

3.6 Good practices and areas for further development regarding setting objectives

The following **good practices** were identified:

- A national consultation was carried out as part of the process to set flood risk objectives.
- The objectives include minimising health and safety risks in construction, operation and maintenance of measures, as well as adaptability to potential impacts of climate change.
- The use of a system of local weightings applied to the objectives indicates the relevance of each objective within the catchment; this system is then used in the selection of measures. This offers flexibility for individual catchments and allows the specific needs of catchments to be prioritised.
- Indicators and targets have been identified for the objectives; however, this information is found in supporting documents rather than the FRMPs themselves.
- The methodologies used to select measure options at both national and local level on the basis of the objectives are clearly described in supporting documents
- Sub-objectives include avoiding damage and enhancing Natura 2000 areas and including the maintenance/improvement of conditions that allow upstream migration for fish species

The following **areas for further development** were identified:

- The documents reviewed do not provide a clear a timeframe for the achievement of the objectives.

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4. Planned measures for the achievement of objectives

Ireland reported 25 XMLs covering all UoMs. The number of XMLs corresponds to the FRMPs with the exception of those FRMPs concerning the Shannon (IEGBNISH) and North Western (GBNIIENW). In these cases, the XMLs were reported at RBD level rather than UoM level. This means information for four FRMPs (UoMs 23-28) was reported under the single IEGBNISH (Shannon RBD) XML, and FRMP 01 and FRMP 36 were reported under the single GBNIIENW (North Western RBD) XML. For all XMLs, including the five FRMPs that have been assessed, the total number of individual measures is 276, and the number of aggregated measures[63] is 325. In consequence, the total number of measures is 601 (the FRMPs do not explain how individual and aggregated measures are defined). The average number of measures per UoM is 24, with a range between 13 and 68 measures per UoM[64]. (Please see Annex A for tables and charts on measures for this and subsequent questions in this section.)

Ireland has reported measures for three of the four aspects of flood risk management: protection, prevention, and preparedness. No measures were reported for the fourth aspect, recovery and review (measure codes M51-M53); however, "Recovery and Review" measures were reported as "Preparedness" measures[65]. Within that, the 25 XMLs reported each contain most of the measure types defined[66]. For all XMLs reported, in terms of the number of measures associated with specific measure types, Protection measures are in the majority, with 269 measures (45 %). These are followed by Prevention (190 measures or 32 %) and Preparedness (113 measures or 19 %) and "other" measures (29 measures or 5 %).

The number and types of measures reported for each UoM were similar, with two exceptions – for both IE09 (Liffey-Dublin Bay) and IEGBNISH (Shannon RBD), Ireland reported a large number of protection measures compared to other UoMs, as well as the largest proportion of

[63] The Reporting Guidance mentions "Measures can be reported as individual measures (recommended for major projects) or aggregated measures" and also notes that measures may be comprised of "many individual projects". European Commission, Guidance for Reporting under the FD (2007/60/EC), 2013, pp. 54-58.

[64] The information reported to WISE was the starting point for the assessment in this section. The majority of the statistics presented are based on processing of information reported to WISE. Assuming that the Member States accurately transferred the information contained in their FRMPs to the Reporting Sheets (the sheets are the same for all Member States and are not customisable) and barring any errors in the transfer of this information to WISE arising from the use of interfacing electronic tools, these statistics should reflect the content of the FRMPs.

[65] Ireland subsequently noted that in Ireland, the pillars of flood risk management are classified as 'Prevention', 'Protection' and 'Preparedness and Resilience', whereby 'Recovery and Review' are included as part of 'Preparedness and Resilience'."

[66] For details about all measure aspects and all measure types, see Annex B.

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total measures (75 % and 79 % protection measures respectively, compared to the average across all FRMPs of 45 %). IE09 (Liffey-Dublin Bay) is the most densely populated UoM in Ireland, while the NIGBNISH Reporting Sheet covers all Shannon FRMPs (although the number of Prevention, Preparedness, and "other" measures is similar to those in all other UoMs).

The FRMPs set out national-level measures ("Measures Applicable for all Areas")[67] as well as existing[68] and proposed measures at catchment/sub-catchment level ("Catchment" and "Community measures[69]")[70]. These proposed measures are referred to as "Flood Risk Management Options[71]" and were included in (and consulted on) as part of the preparation of the FRMP. Where relevant, information on proposed measures are set out in Appendix G of the FRMPs. In the FRMPs, it is stated that "The flood protection measures set out in the Plan are to an outline design and are not at this point ready for construction. Further detailed design, including a review of costs and benefits, environmental assessment, and consultation will be required for such works before implementation"[72].

4.1 Cost of measures

No information on the costs of measures was provided in the Reporting Sheets. The FRMPs assessed set out the expected costs for most of the proposed measures, which are usually at community-level/AFA level73. Information is typically not provided for measures already in progress/completed (which are usually national-level measures). Table 6 below sets out the total estimated cost of the proposed measures presented in each FRMP assessed.

The methodology for estimating costs is not set out in the FRMPs or the Reporting Sheets, although two FRMPs mention a Unit Cost Database when describing certain potential measures without providing further details74. The Preliminary Options Reports prepared for each UoM include detailed costing information on the proposed measures, including the Unit Cost Database.

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[67] All FRMPs assessed, section 7.4.1. "Measures Applicable for all Areas".

[68] All FRMPs assessed, section 2.6 "Existing Flood Risk Management Measures".

[69] Community Measures also concern AFA-level measures, although not all Community Measures are AFA-level.

[70] All FRMPs assessed, section 7.4 "Outcomes".

[71] The FRMPs assessed refer to flood risk management "options", which can include more than one possible measure or management method.

[72] All FRMPs assessed, Executive Summary, "Scope of the Plan".

[73] All FRMPs assessed, section 7.4 and Appendix G.

[74] FRMP 01 North Western and FRMP 09 Liffey and Dublin Bay.

Table 6 Estimated costs for proposed community-level measures in the FRMPs assessed

UoM	Estimated overall budget of planned measures (2018-2021) in million EUR
FRMP IE01 (North Western)[75]	60
FRMP IE09 (Liffey and Dublin Bay)[76]	55
FRMP IE19 (Lee, Cork Harbour and Youghal Bay)[77]	7
FRMP IE25-26 (Shannon Upper & Lower)[78]	98
FRMP IE32-33 (Erriff-Clew Bay - Blacksod-Broadhaven)[79]	0.54

Source: FRMPs

Note: these figures do not include the cost of national-level measures ("Measures Applicable for All Areas"), nor community-level measures already in progress/completed.

In each FRMP assessed, there are measures specifically to undertake a detailed assessment of the costs of other, potential measures identified[80]. For example, in FRMP for IE09 (Liffey and Dublin Bay) there is a measure (code IE09-UoM-0999-M25) entitled "Undertake a Detailed Assessment of the Costs of the Potential Flood Forecasting and Warning for the Liffey-Dublin Bay (UoM09) River Basin" (while there is a separate measure IE09-UoM-9031-M41, for the "Establishment of a National Flood Forecasting and Warning Service")[81].

4.2 Funding of measures

According to the XML summaries, the Government's National Development Plan 2018 to 2027[82] has committed up to €1 billion for flood relief measures[83]. This is distributed via the

[75] FRMP 01 North Western sections 7.4.3-7.4.22.4, pp 78-112.

[76] FRMP 09 Liffey and Dublin Bay sections 7.4.3-7.4.28.2, pp 88-111.

[77] FRMP 19 Lee, Cork Harbour and Youghal Bay, sections 7.4.2-7.4.4 pp. 83-87. Note that most measures in the FRMP are currently underway, and no budget is presented in the FRMP for these measures.

[78] FRMP 25-26 Shannon Upper & Lower sections 7.4.4-7.4.42.1, pp. 86-127.

[79] FRMP 32-33 Erriff-Clew Bay - Blacksod-Broadhaven section 7.4.3-7.4.4, pp. 69-72. Note that for most communities no economically viable measures have been identified.

[80] E.g. FRMP 01 North Western p. 117, FRMP 09 Liffey and Dublin Bay p. 116, FRMP 19 Lee, Cork Harbour and Youghal Bay p. 93, FRMP 25-26 Shannon Upper & Lower p 130, FRMP 32-33 Erriff-Clew Bay - Blacksod-Broadhaven p 80.

[81] FRMP 09 Liffey and Dublin Bay, p 84 and 110.

[82] The National Development Plan 2018 - 2027 (NDP) sets out the investment priorities that will underpin the implementation of the National Planning Framework, through a total investment of approximately €116 billion. https://www.gov.ie/en/policy-information/07e507-national-development-plan-2018-2027/#:~:text=The%20National%20Development%20Plan%202018,of%20approximately%20%E2%82%AC116%20billion.

[83] XML summaries, Summary of the Objectives.

OPW, including the Minor Flood Mitigation Works and Coastal Protection Scheme, which can fund projects costing of up to €750,000[84].

Each FRMP assessed presents a summary of Flood Risk Management Measures, identifying the responsible authority and the funding of the measure[85]. Measures are mostly funded by the Office of Public Works (OPW)[86] (including the Minor Works Scheme) and local authorities (including County Councils) as well as Planning Authorities, the Department of Housing, Planning and Local Government and implementation bodies. Homeowners (those affected by flooding) have also been identified as a funding source, for example for the measure "Voluntary Home Relocation Scheme" (applicable for all areas), humanitarian assistance for those primary residences worst affected by these floods is provided by the government, but at present there is no financial assistance for other home-owners choosing to relocate due to their flood risk[87]. Similarly for the measure "Individual Property Protection" (applicable for all areas), there may be some existing tax relief for some homeowners to undertake works to prevent flood risk; however, there is currently no other public financial support[88].

Table 7 Funding of measures

	All UoMs assessed
Distribution of costs among those groups affected by flooding	✓
Use of public budget (national level)	✓
Use of public budget (regional level)	
Use of public budget (local level)	✓
Private investment	
EU funds (generic)	
EU Structural funds	
EU Solidarity Fund	
EU Cohesion funds	
EU CAP funds	
International funds	
European Social Fund	

Source: FRMPs[89]

[84] All FRMPs assessed, section 2.6.x, "Minor Works".

[85] All FRMPs assessed, section 7.7 "Summary of Proposed Works".

[86] The OPW is the competent authority responsible for the implementation of the Floods Directive.

[87] All FRMPs assessed, section 7.4.1.3, "Prevention: Voluntary Home Relocation"

[88] All FRMPs assessed, section 7.4.1.13 or 7.4.1.14, "Preparedness: Individual Property Protection"

[89] All FRMPs assessed, section 7.7 "Summary of Proposed Measures".

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4.3 Measurable and specific (including location) measures

The FRMPs assessed include a clear and explicit description of the measures with regard to:

- What they are trying to achieve,
- Where they are to be achieved (location; the area of impact is not specified, as explained in section 4.5 below).

How the measures are to be achieved is, however, often not very specific, especially as many of the proposed measures are provisional. Moreover, there is no indication as to when any measures are expected to be achieved[90].

With regard to where they are to be achieved (location), measures are identified as "Measures Applicable for All Areas" (national), "catchment/sub-catchment area" measures, and "community" measures. Only two of the assessed FRMPs identified catchment/sub-catchment level measures: the FRMP for IE25-26 (Shannon Upper & Lower) has measures concerning the Shannon basin, and the FRMP for IE32-33 (Erriff-Clew Bay and Blacksod-Broadhaven) has a measure concerning several AFAs. For the sub-national measures (catchment/sub-catchment and community measures), the relevant community is clearly identified and in the case of structural measures in particular it is clear where the measure will be implemented.

Table 8 Location of measures

	FRMP 01 North Western	**FRMP 09 Liffey and Dublin Bay**	**FRMP 19 Lee, Cork Harbour and Youghal Bay**	**FRMP 25-26 Shannon Upper & Lower**	**FRMP 32-33 Erriff-Clew Bay - Blacksod-Broadhaven**
International					
National	✓	✓	✓	✓	✓
RBD/UoM				✓	
Sub-basin					✓
AFA[91] or Community	✓	✓	✓	✓	✓
Water body level					
More detailed than					

[90] Irish authorities pointed out that the funding of the measures set out in the FRMPs is derived from the National Development Plan 2018-2027, and this plan sets the intended timeframe for delivery (this is unsubstantiated in the FRMPs assessed and the CFRAM Technical Note).

[91] Areas of potentially significant flood risk are referred to as Areas for Further Assessment, or 'AFAs' in Ireland, and are usually designated on Community level. It is worth noting that some Communities not identified as AFAs have proposed measures (see for example Cobh in FRMP 19 Lee, Cork Harbour and Youghal Bay).

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	FRMP 01 North Western	FRMP 09 Liffey and Dublin Bay	FRMP 19 Lee, Cork Harbour and Youghal Bay	FRMP 25-26 Shannon Upper & Lower	FRMP 32-33 Erriff-Clew Bay - Blacksod-Broadhaven
water body					

Source: FRMPs section 7.7

4.4 Measures and objectives

In the FRMPs reviewed, each proposed measure is assessed against each objective using both a national and a local weighting system, and a comment is given for each assessment[92]. Consequently, the FRMPs assessed show how proposed measures will contribute to which objectives. For existing measures, there is no specific link provided to the objectives (though it is possible such an assessment was undertaken in the past during the identification of these measures as well).

The FRMPs assessed do not indicate whether the objectives will be achieved with the set of measures identified – although potential measures are assessed more favourably the more they contribute to achieving the objectives. Therefore, although measures are assessed for their effectiveness against individual objectives, the effectiveness of the measures as a whole vis-à-vis the overall objective is not assessed in the FRMP.

4.5 Geographic scale of measures

Ireland has reported the location of all measures but not their geographic scale (i.e. their area of impact).

The locations reported to WISE for each measure can be grouped into UoM, APSFR (AFA), or other. It is worth noting the "Measures Applicable for All Areas" (i.e. national-level measures that include both grey and green infrastructure measures such as home relocation, sustainable urban drainage systems, local abstraction, planning channel maintenance, and flood forecasting) are reported to WISE as UoM measures (as shown in Annex A), and are identical for all UoMs: each XML reporting each of the 13 national-level measures. Across all XMLs, with 601 measures reported, 325 apply to the whole UoM, and 266 to an APSFR/AFA. Ten measures have been reported as having a location other than AFA or UoM – these measures are either explicitly identified as "not an AFA" or it is not clear. Most Prevention and Preparedness measures are at UoM level, while almost all Protection measures are at APSFR level. For further data, see Tables A6 and A7 in Annex A.

[92] All FRMPs assessed, Appendix G "MCA Appraisal Outcomes".

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The FRMPs assessed indicate that the geographical scale of the impacts of measures has been assessed. According to standard text in all FRMPs, "Measures to manage flood risk can be applied at a range of spatial scales, namely the whole River Basin, at a catchment- or sub-catchment level, or at an AFA or local level. The assessment of possible flood risk management measures has been undertaken at each of these spatial scales of assessment under the CFRAM Programme, to ensure that a catchment-based approach is taken. This is to ensure that a measure that may benefit multiple areas or AFAs is fully considered, and that potential impacts of measures elsewhere in the catchment (e.g. up- and down-stream) are assessed and understood"[93].

4.6 Prioritisation of measures

According to the FRMPs, three "streams" have been identified for the sake of prioritisation of proposed measures:

- Large Schemes: Measures costing in excess of €15m.
- Medium and Small Schemes: Measures costing in between €750k/€1m and €15m.
- Minor Schemes: Measures costing less than €750k/€1m[94].

It appears that this methodology is relevant only for structural protection measures, as the FRMPs state that "The prioritisation primarily relates to the protection measures to be implemented by the OPW or funded by the OPW but implemented by a local authority". It is not clear how this methodology works to prioritise the measures, especially those Minor and Medium and Small Schemes which appear to be prioritised as the local and regional authorities see fit (rather than following a commonly agreed specific methodology)[95].

Potential measures are assessed using a Multi-Criteria Analysis, which includes an assessment of how the options for the same location rank, including in terms of costs, benefits and relationship to objectives; however, there is no further information concerning how the measures of different locations are prioritised against each other. No information was provided in the Reporting Sheets regarding the category of priority for measures.

No information is provided regarding the timetable for the implementation of the measures in either the Reporting Sheets or the FRMPs themselves. It is noted that the funding under the Government's National Development Plan 2018-2027 is restricted to the duration of this Plan,

[93] All FRMPs assessed section 7.3.1.

[94] XML summaries, Summary of the Objectives, all FRMPs section 7.5 "Prioritisation of measures".

[95] Ireland subsequently noted that the first tranche of schemes was announced with the publication of the FRMPs, covering schemes of all three priority levels. https://www.gov.ie/en/press-release/5f18ca-kevin-boxer-moran-publishes-flood-risk-management-plans-and-announce/

and that measures may be adapted (especially with regard to climate change) for the next cycle of FRMPs[96].

4.7 Authorities responsible for implementation of measures

The Reporting Sheets show that of all the XMLs reported, covering 601 measures, roughly half of the measures (306) are the responsibility of national OPW, often together with other authorities such as local authorities and the national EPA. Another 25 measures are the responsibility of either the OPW or the EPA. For 116 measures it is reported that the responsible authorities are either the OPW or local authorities, and in a further 118 measures local authorities are the responsible authorities. 152 measures are the responsibility of other authorities/actors. Please see Annex A Table 8 and Table 9 for further information.

The FRMPs assessed provide, for each proposed measure, the authority responsible for implementation and the authority responsible for funding[97]. In most cases the funding authority aligns with the implementation authority; however, for community (i.e. AFA/APSFR) level measures the implementing authority is listed as OPW/local authorities, as the options for the proposed measures have not been confirmed. Funding for these measures comes from the OPW.

4.8 Progress of implementation of measures

The Reporting Sheets include the progress of implementation for each measure (both existing measures and proposed measures) however, the Reporting Sheets do not provide progress descriptions, an optional field.

Of the 601 measures reported, 365 have been reported as "progress ongoing" (mostly the national measures found in each UoM and the existing flood relief schemes already in place); in addition, 12 of the 269 protection measures have been reported as "ongoing construction". The majority of all Prevention, Preparedness, and "Other" measures are reported as "progress ongoing", but only 36% of all Protection measures are reported as "progress ongoing" or "ongoing construction". 171 measures, 28% of the total of 601 measures, have not been started (mostly Protection measures) and 53 measures (52 Protection measures and one Other) have been completed, 9% of the total.

The number of measures reported as "progress ongoing" is similar across all UoMs (with the exception of IE09 (Liffey and Dublin Bay) which has a larger number of measures in general, and proportionately a smaller number of "progress ongoing" measures than other UoMs).

[96] All FRMPs assessed section 7.5, Appendix G, XML summaries, Summary of the Objectives.

[97] All FRMPs assessed, section 7.5, Summary of Proposed Measures.

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The share of completed measures is 10% or less in most UoMs; two key exceptions are IE09 (Liffey and Dublin Bay) and NIGBNISH (Shannon RBD), the two UoMs with the highest numbers of measures: their shares of completed measures are 28% for IE09 and 21% for NIGBNISH. In only two FRMPs are more than half of the measures reported as "not started": NIGBNISH (Shannon RBD) and GBNIIENW (IE 01 and IE 36 North Western). Please see Annex A Table 10 and Table 11 for further details.

4.9 Measures taken under other Community Acts

The Reporting Sheets did not include any information with regard to Other Community Acts, and the FRMPs do not identify any specific measures which have been established because of other Community legislation. However, the FRMPs make it clear that the FRMPs have undergone a strategic environmental assessment (as per the SEA Directive) and where necessary Appropriate Assessments (AAs) as per the Habitats Directives were carried out[98]. It is clearly stated that an EIA is required before proposed projects can commence, and that the SEA undertaken for the Plan included an assessment of the flood management options. Furthermore, an SEA has been undertaken for at least some national measures already in place. For example, an SEA was conducted for the national Arterial Drainage Maintenance activities for the period 2011-2015 and a further SEA process was again carried out for the national Arterial Drainage Maintenance activities for the period 2016-2021. Appropriate assessments are also carried out on an ongoing basis for Arterial Drainage Maintenance operations[99].

4.10 Specific groups of measures

Spatial planning/land use measures have been included in all FRMPs assessed. Appendix F of all FRMPs sets out flood management methods, and identifies sustainable planning and development management, Sustainable Urban Drainage Systems (SUDS), voluntary home relocation, preparation of local adaptation planning and land use management and natural flood risk management measures as flood prevention methods[100]. In all FRMPs these measures are listed as "Measures Applicable for All Areas". For example, a measure for "Assessment of Land Use and Natural Flood Risk Management Measures"[101] states that the OPW will work with the EPA, local authorities and other agencies during the project-level assessments of physical works and more broadly at a catchment-level to identify, where possible, measures

[98] All FRMPs assessed, e.g. section 6.1 Environmental Considerations: Overview.

[99] FRMP 01 North Western, FRMP 09 Liffey and Dublin Bay, FRMP 19 Lee, Cork Harbour and Youghal Bay, FRMP 25-26 Shannon Upper & Lower, section 7.4.1.7 Protection: Maintenance of Arterial Drainage Schemes and Existing Flood Relief Schemes.

[100] All FRMPs assessed, Appendix F, section F1.

[101] M31, Natural flood management measures (Protection).

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that will have benefits for both WFD and flood risk management objectives, such as natural water retention measures, and also for biodiversity and potentially other objectives[102]. Another example is a measure "Consideration of Flood Risk in local adaptation planning"[103], which calls for local authorities to take into account the potential impacts of climate change on flooding and flood risk in their planning for local adaptation, in particular in the areas of spatial planning and the planning and design of infrastructure[104].

The FRMPs assessed indicate that Ireland has a framework for halting or controlling building construction and development in flood plains, developed in recent years, and there are measures in place to implement this. For example, two "Measures Applicable for All Areas" include the Application of the Guidelines on the Planning System and Flood Risk Management (DHPLG/OPW, 2009)[105] and the Voluntary Home Relocation Scheme[106]. According to the FRMPs, the application of the Guidelines on the Planning System and Flood Risk Management by the planning authorities is essential to avoid inappropriate development in flood prone areas, and hence avoid unnecessary increases in flood risk into the future. It includes, where appropriate, a review of existing land use zoning and the potential for blue/green infrastructure, in order to support sustainable development.

Guidelines published under Section 28 of the Planning and Development Acts provide a transparent and robust framework for the consideration of flood risk in planning and development management[107]. It ensures that a flood risk assessment is undertaken to inform decision-makers early in planning and development management processes. It also requires that development is avoided in floodplains unless there are demonstrable, wider sustainability and proper planning objectives that justify appropriate development and where the flood risk to such development can be reduced and managed to an acceptable level without increasing flood risk elsewhere (as set out through the Justification test). In flood-prone areas where development can be justified (i.e. re-development, infill development or new development that has passed the Justification Test), the planning authorities can manage the risk by setting suitable objectives or conditions, such as minimum floor levels or flood resistant or resilient building methods[108].

[102] All FRMPs assessed section 7.4.1.5.

[103] M24, Other prevention measures.

[104] All FRMPs assessed section 7.4.1.4.

[105] M21, All FRMPs assessed section 7.4.1.1.

[106] M22, All FRMPs assessed section 7.4.1.3.

[107] All FRMPs assessed, Table 1.1.

[108] All FRMPs assessed, Appendix F, section F.1.1 "Sustainable Planning and Development Management".

The implementation of the once-off Voluntary Homeowner Relocation Scheme has been put in place by Government in 2017 to provide humanitarian assistance for those primary residences worst affected by these floods.

Natural Water Retention Measures: Appendix F of all FRMPs assessed sets out Flood Management methods. Under flood protection methods it addresses "storing flood waters". However, with regards to natural water retention measures, the FRMPs assessed all state that "while these have been shown to reduce flood flows in smaller, more common floods, it is understood that their impact in larger, more extreme or rare floods, is reduced. Further research is required on this matter. However, such measures can have significant benefits for environmental enhancement, such as contributing to the objectives of the Water Framework Directive or increasing biodiversity"[109].

One of the "Measures Applicable for All Areas" is the Implementation of Sustainable Urban Drainage Systems (SUDS)[110]**.** This measure concerns the implementation of the Guidelines on the Planning System and Flood Risk Management (DHPLG/OPW, 2009), and ensures planning authorities seek to reduce the extent of hard surfacing and paving and require, subject to the outcomes of environmental assessment, the use of sustainable drainage techniques.

NWRM are also mentioned under the "Measures Applicable for All Areas" measure "Assessment of Land Use and Natural Flood Risk Management Measures"[111], which calls for the OPW to work with the EPA, local authorities and other agencies during the project-level assessments of physical works and more broadly at a catchment-level to identify, where possible, measures that will have benefits for both WFD and flood risk management objectives, such as natural water retention measures, and also for biodiversity and potentially other objectives[112].

Measures that specifically consider nature conservation: Nature conservation is covered by three common sub-objectives: "Provide no impediment to the achievement of water body objectives and, if possible, contribute to the achievement of water body objectives" (Objective 3.a.i); "Avoid detrimental effects to, and where possible enhance, Natura 2000 network, protected species and their key habitats, recognising relevant landscape features and stepping stones" (Objective 3.b.i); and to "Avoid damage to or loss of, and where possible enhance,

[109] All FRMPs assessed Appendix F, section F.2.5.

[110] All FRMPs assessed section 7.4.1.2, M34.

[111] M31.

[112] All FRMPs assessed section 7.4.1.5.

nature conservation sites and protected species or other known species of conservation concern" (Objective 3.c.i)[113].

There are no measures specifically in place to enhance or protect nature; however, one of the "Measures Applicable for All Areas", measure "Assessment of Land Use and Natural Flood Risk Management Measures" [114], which sets out how the OPW will work with the EPA, local authorities and other agencies to identify, where possible, measures that will have benefits for objectives including biodiversity. Furthermore, the FRMPs assessed state that all measures are evaluated against all objectives, and the environmental impact of each measure is considered, including as part of the SEA/EIA, but also as part of the Appropriate Assessment under the Habitats Directive (where relevant)[115]. In only one of the FRMPs assessed, the FRMP for 09 (Liffey and Dublin Bay), were two measures identified as holding potential for improved biodiversity in the area[116].

In addition, the FRMPs refer to the Natura Impact Statement which also accompanied the Draft RBMPs[117] and set out the potential impacts of possible measures on Natura 2000 sites[118].

According to the Reporting Sheets, **Navigation and Port Infrastructure** is covered by the Objective to "Minimise risk to transport infrastructure" (Objective 2.b.i)[119]. The Objectives were taken into account in the identification of measures, with each measure evaluated against all objectives; however, it is not clear how this objective was addressed by the measures.

Among the Community-level measures, one FRMP identifies navigation and port infrastructure measures. In the FRMP for IE25-26 (Shannon Upper & Lower), a measure concerns the "Ongoing Operation and Maintenance of Infrastructure Associated with Hydro-Power Generation on the River Shannon", which includes the maintenance of weirs and some navigation canals, related to navigation on the River Shannon. It is noted that it is important for the avoidance of increased flood risk that this infrastructure is operated according to the relevant regulations and is maintained in good working order into the future[120]. A second measure, "Coordination of water level management on the River Shannon" ensures water levels in Lough Allen and Lough Ree lakes are managed to ensure minimum navigation levels in the river during dry periods and to reduce the impacts of floods as far as reasonably

[113] All FRMPs assessed section 1.4.2, Table 1.2.

[114] M31.

[115] All FRMPs assessed, section 6.

[116] FRMP 09 Liffey and Dublin Bay, section 7.4.6 Dublin City AFA Measures - Carysfort Maretimo HPW and 7.4.10 Naas AFA Measures.

[117] This document has been reported to WISE by Ireland as part of the RBMP reporting.

[118] All FRMPs assessed, section 6.1.

[119] All FRMPs assessed section 1.4.2, Table 1.2.

[120] FRMP 25-26 Shannon Upper & Lower section 7.4.1.16 p. 82.

possible. The levels of the navigation channel in between the lakes are managed by Waterways Ireland[121].

The FRMP for IE25-26 (Shannon Upper & Lower) also covers the Limerick Port Area. The Community-level measure for this area concerns properties at risk of flooding in the area, and states that the risk can only be reduced with the use of structural defences. There is a significant challenge in providing flood defences while also not disrupting the ports activities. This measure includes demountable defences along two sections of the port. A new set of mitre gates that open out into the estuary are also included as part of this measure[122].

Concerning measures for **dredging**, Appendix F of all FRMPs sets out Flood Protection Methods and identifies "Increasing Channel Conveyance" as a flood protection measure. It states that this can be done "by works such as dredging to deepen and/or widen the river, reducing the roughness of the rivers, its banks and floodplain to allow more flow to pass, or removing or altering structures to reduce the build-up of water upstream of the structure". Four of the five FRMPs assessed included Community-level measures with (potential) dredging. FRMP 32-33 Erriff-Clew Bay - Blacksod-Broadhaven only included the reference in Appendix F.

4.11 Recovery from and resilience to flooding

As noted above, Ireland did not report any measures with measure codes M51-M53 (Recovery and Review)[123].

All FRMPs assessed include a description of "Flood Preparedness (Resilience) Methods"[124]. It is stated that the actions and measures of this type include:

- Flood Forecasting and Warning,
- Emergency Response Planning,
- Promotion of Individual and Community Resilience,
- Individual Property Protection,
- Flood-Related Data Collection.

[121] FRMP 25-26 Shannon Upper & Lower section 7.4.1.15 p. 82.

[122] FRMP 25-26 Shannon Upper & Lower section 7.4.19 p. 105.

[123] Ireland subsequently noted that in Ireland, the pillars of flood risk management are classified as 'Prevention', 'Protection' and 'Preparedness and Resilience', whereby 'Recovery and Review' are included as part of 'Preparedness and Resilience'.

[124] All FRMPs assessed, section 7.2.3.

The FRMPs assessed set out national-level methods to address these points, which have been reported as Preparedness measures (M41-M43). There are no other Preparedness measures reported at community level.

No specific measures were identified concerning insurance. Nonetheless, the role of insurance policies was raised during consultations for the FRMP for IE01, North Western, and the FRMP for IE25-26, Shannon Upper & Lower [125]. In the FRMP for the North Western UoM, it was noted that the OPW and Dept. Finance are engaging with the insurance industry (specifically Insurance Ireland, the representative body of the insurance industry[126]) in relation to the availability of insurance for properties at risk from flooding through a Memorandum of Understanding. The MOU sets out principles of how the two organisations work together and meet quarterly to ensure that appropriate and relevant information on completed schemes is provided to insurers to facilitate the availability to the public of insurance against the risk of flooding. It was also noted that to date OPW has provided details to Insurance Ireland on 18 completed schemes nationally, and this association has advised that flood insurance cover is included in 83% of policies in these defended areas[127].

Ecosystem services are not mentioned specifically in any of the FRMPs assessed, and there is no information to indicate that they are considered in estimating restoration costs in cases where potentially polluting sites and installations may be flooded. Objectives 3.d.i, 3.e.i, and 3.f.i, while not referring to ecosystem services, are related to them as they concern the protection and enhancing of fisheries, landscape character and visual amenity, and features, institutions, and collections of cultural heritage importance[128].

4.12 Monitoring progress in implementing the FRMPs

According to the FRMPs assessed, the OPW will monitor, on an ongoing basis, progress in the implementation of measures for which it has responsibility as part of its normal business management processes. The OPW will coordinate and monitor progress in the implementation of the Plans through an Interdepartmental Co-ordination Group. On a six-yearly cycle, the OPW will undertake a full review of the progress in the implementation of the Plan and the level of flood risk. In addition, monitoring of compliance with the Guidelines on the Planning

[125] FRMP 25-26 Shannon Upper & Lower section 7.4.19 p. 106.

[126] Insurance Ireland represents almost 130 companies providing insurance domestically in Ireland and internationally from Ireland (https://www.insuranceireland.eu/about-us/about-us) and was also involved in the stakeholder consultation of the FRMPs.

[127] FRMP 01 North Western section 7.4.3 p. 77.

[128] All FRMPs assessed section 1.4.2, table 1.2.

System and Flood Risk Management will be carried out through ongoing review of development plans, local area plans and other forward planning documents[129].

The FRMPs assessed do not, however, specify dates by which each measure should be implemented or subsequently monitored.

The FRMPs also note that the SEA Directive requires that the significant environmental effects of the implementation of a Plan are monitored in order to identify at an early stage unforeseen adverse effects and in order to undertake appropriate remedial action[130].

Three FRMPs provide additional information regarding environmental monitoring to implement their SEAs. In FRMP 01 North Western and FRMP 09 Liffey and Dublin Bay, Table 8.1[131] setting out the common objectives and sub objectives identifies indicators for monitoring, possible data sources and the responsible authority. In the FRMP for Lee, Cork Harbour and Youghal Bay it is noted that "As part of the monitoring programme, relevant and appropriate thresholds will be agreed in consultation with the competent authorities to determine when remedial action is required for the particular aspect of the environment being monitored"[132]. Furthermore, existing environmental monitoring is currently undertaken throughout Ireland by the OPW and other organisations like the EPA, IFI, and NPWS, for a number of environmental elements in accordance with environmental legislation, and these sources will be used as baseline data or reference[133].

In the FRMP for IE32-33 Erriff-Clew Bay - Blacksod-Broadhaven, information is provided regarding the baseline for monitoring[134]. In this case, it is reported that the EPA's Catchment Portal (www.catchments.ie) can be used as a baseline for the environmental status of a habitat or waterbody prior to the commencement of any projects arising from the Plan.

Regarding monitoring for the same Plan as a whole, this FRMP states that a full monitoring programme is difficult to present at this stage because some elements of the Plan are dependent upon changes to current strategic documents such as the County and City Development Plans. The same FRMP recommends that all the monitoring data generated from the implementation of the Plan is stored in a centralised database that can be accessed nationally and that the review should focus on:

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[129] All FRMPs assessed, section 8.2 "Monitoring of Progress in Implementation of the Plan".

[130] All FRMPs assessed, section 8.2 "Monitoring of Progress in Implementation of the Plan".

[131] FRMP 01 North Western and FRMP 09 Liffey and Dublin Bay, section 8.3.

[132] FRMP 19 Lee, Cork Harbour and Youghal Bay section 8.3.1 p 98.

[133] FRMP 19 Lee, Cork Harbour and Youghal Bay section 8.3.1 p 98.

[134] FRMP 32-33 Erriff-Clew Bay - Blacksod-Broadhaven section 8.3 p. 84.

- The level of progress of the Plan that has occurred in Erriff-Clew Bay & Blacksod-Broadhaven River Basin over the previous 6 years.
- Have any significant impacts occurred during this period?
- What new data has been accumulated from other programmes during this timeframe and how has it being made available to the OPW?
- What Plans/Programmes have been initiated during this period that could influence/impact on the Plan for the Erriff-Clew Bay & Blacksod-Broadhaven River Basin?
- How have these new Plans/Programmes been integrated into the Plan?
- Does the review of the monitoring data for this period highlight any changes/amendments that should be made to the Plan or the National CFRAM programme?
- Has the review identified more areas at risk of flooding and will the revised Plan require a revised SEA and AA?
- Have any new approaches to flood management been identified within this period?
- What progress has been made with integrating Flood Risk Management Plans with other Plans and Programmes such as the WFD, National Biodiversity?

4.13 Coordination with the Water Framework Directive

The table below shows how the development of the FRMP has been coordinated with the development of the second River Basin Management Plan of the WFD.

Table 9 Coordination of the development of the FRMP with the development of the second River Basin Management Plan of the WFD

	All UoMs assessed
Integration of FRMP and RBMP into a single plan	
Joint consultation of draft FRMP and RBMP	
Coordination between authorities responsible for developing FRMP and RBMP	✓
Coordination with the environmental objectives in Art. 4 of the WFD	✓
The objectives of the Floods Directive were considered in the preparation of the RBMPs	✓
Planning of win-win and no-regret measures in the FRMPs	✓
The RBMP's PoMs include win-win measures in terms of achieving the objectives of the WFD and Floods Directive, drought management and NWRMs	✓
Permitting or consenting of flood risk activities (e.g. dredging, flood defence maintenance or construction) requires prior consideration of WFD objectives and RBMPs	✓
Natural water retention and green infrastructure measures have been included	✓
Consistent and compliant application of WFD Article 7 and designation of heavily modified water bodies with measures taken under the FD e.g. flood defence infrastructure	
The design of new and existing structural measures, such as flood defences, storage dams and tidal barriers, have been adapted to take into account WFD Environmental Objectives	✓

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	All UoMs assessed
The use of sustainable drainage systems, such as the construction of wetland and porous pavements, have been considered to reduce urban flooding and also to contribute to the achievement of WFD Environmental Objectives	✓

The Reporting Sheets and the FRMPs set out the relationship between implementation of the WFD and implementation of the Floods Directive in Ireland[135]. The Department of Housing, Planning and Local Government (DHPLG) is the lead Government Department for the WFD and the RBMPs, and the OPW has held bilateral meetings with senior representatives in the Department of Housing, Planning and Local Government to establish the appropriate methods and approaches to coordination. For the second cycle of implementation of the WFD, the Environmental Protection Agency (EPA) has been defined as the Competent Authority for undertaking the characterisation of water bodies and reporting under the WFD to the European Commission, and is also required to assist the DHPLG in its assigned duties. The OPW has held bilateral meetings with the EPA since 2013 to determine the suitable approaches to the practical aspects of implementation, which were agreed to be through cross-representation on management or governance groups, and ongoing bilateral meetings. These meetings have included workshops to share relevant data.

The Water Policy Advisory Committee (WPAC) provides strategic direction and advises the Minister for Housing, Planning and Local Government on the implementation of the WFD. The OPW is represented on the WPAC to help ensure coordination in the implementation of the WFD and the Floods Directive at a strategic level. The National Implementation Group (NIG) assists the EPA and DHPLG with the technical and scientific implementation aspects of the WFD to ensure effectiveness, consistency and efficiency. The Group has also been established to provide a mechanism for coordination with the implementation of the FD. A working group on the programme of measures under the WFD has also been established under the WPAC. The OPW is represented on the NIG, and also on the characterisation and hydromorphology working groups, to promote coordination on the technical and scientific aspects of mutual relevance in implementation.

The Catchment Management Network was convened to provide a forum for the organisations involved in implementation of the WFD, and includes key stakeholders, at the regional and local level, including the local authorities. The OPW engages with the Network to consider the coordination issues in implementation at a local level.

[135] Reporting Sheets, Summary of the Development, All FRMPs assessed, section 6.5 "Coordination with the Water Framework Directive".

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The Local Authority Water and Communities Office (LAWCO) was established in 2015 and functions include supporting communities to take action to improve their local water environment and provision of coordination at a regional level across public bodies involved in water management[136]. The OPW has followed the development of the LAWCO through the WPAC and NIG. This local level of activity may provide a suitable point of coordination for local flood risk management activities such as flood protection works being implemented under the Minor Works Scheme or the promotion of natural water retention measures.

From the side of the Floods Directive, the DHPLG and the EPA are represented on the National CFRAM Steering Group and have advised on coordination matters, such as defining objectives relevant to the WFD. EPA representatives and the WFD Project Coordinators (appointed in the first cycle of WFD implementation, and now replaced by LAWCO officers) are also represented on the Project Steering and Progress Groups as described.

It should be noted that one of the Flood Risk Management Objectives (Objective 3.a) is to support the objectives of the WFD: "Support the objectives of the WFD: Provide no impediment to the achievement of water body objectives and, if possible, contribute to the achievement of water body objectives"[137]. This required an assessment of potential flood risk management measures against the objectives and requirements of the WFD to determine which measures might have a benefit or cause an impact in terms of the objectives of the WFD, varying in scale and duration. In this way, the potential contribution of flood risk management measures towards, or potential impacts on, the objectives of the WFD are embedded into the process for the identification of proposed measures.

The next stage for proposed flood risk management measures will be to undertake more detailed assessment and design at a project level. The assessment at the project level will enable a detailed appraisal of the potential impacts of the final measure on the water body hydro-morphology, hydrological regime and status to be undertaken including, where necessary (if impacts cannot be avoided or mitigated) a detailed appraisal under Article 4(7) of the WFD (derogation related to deterioration caused by new modifications).

According to the FRMPs, the work planned by EPA to improve assessment methods for river morphology has the potential to assist in:

(1) assessing the potential impact of flood management measures on WFD objectives,
(2) identifying the most appropriate mitigation measures, and,

[136] The LAWCO office is operated by Kilkenny and Tipperary County Councils on a local authority shared services basis.

[137] All FRMPs assessed, section 1.4.2, Table 1.2.

(3) supporting decisions on the application of Article 4(7) derogations.

The EPA and OPW will work together to develop technical methods to assist in the assessment of impacts from flood protection schemes. The OPW is also liaising with the EPA on the potential impact of WFD measures on flood risk, which are typically neutral (no impact), or may have some benefit in reducing runoff rates and volumes (e.g., through agricultural measures such as minimising soil compaction, contour farming or planting, or the installation of field drain interception ponds). The OPW will continue to work with the EPA and other agencies implementing the WFD to identify, where possible, measures that will have benefits for both WFD and flood risk management objectives, such as natural water retention measures. The five FRMPs assessed include a measure to this effect relating to land use and natural flood risk management ("Assessment of Land Use and Natural Flood Risk Management Measures"). This coordination will also address measures that may otherwise cause potential conflict between the objectives of the two Directives.

No measures reported in the Reporting Sheet were identified as being reported under both the WFD and the Floods Directive.

4.14 Good practices and areas for further development with regard to measures

The following **good practices** were identified:

- The selection of measures is assessed against the objectives, including objectives concerning the WFD and Habitats Directive and climate considerations.
- The FRMPs assessed clearly set out the funding sources for flood risk management activities and also identified the estimated costs of potential measures.
- Non-structural and NWRMs have been identified, although mostly at national level (e.g. planning and local adaptation measures).
- Public consultations are carried out on proposed flood management options.
- The FRMP objectives, together with institutional coordination mechanisms and measure selection and assessment methods all establish clear links between the WFD and the Floods Directive.
- The FRMPs assessed set out procedures for their review, including the review of environmental indicators identified under their SEAs.
- In one FRMP (IE32-33 Erriff-Clew Bay - Blacksod-Broadhaven), the EPA's Catchment Portal (www.catchments.ie) was identified as a baseline for the environmental status of a habitat or waterbody prior to the commencement of any projects arising from the Plan.

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The following **areas for further development** were identified:

- Although Ireland has measures for recovery and review, these were reported to WISE as preparedness measures.
- While one FRMP indicates that national authorities have coordinated with the insurance industry, no insurance/risk transfer measures have been identified in any of the five FRMPs reviewed.
- Community-level measures have yet to be confirmed and developed. Although work is ongoing to do this, there are no timeframes to either start or complete measures.

5. Consideration of climate change

The FRMPs assessed, as well as Ireland's XML summaries, show that climate change was addressed in flood risk management.

The FRMPs cite Ireland's National Climate Change Adaptation Framework, 2012 & 2018 (NCCAF) as a relevant policy together with the Climate Change Sectoral Adaptation Plan for Flood Risk Management, 2015[138]. The executive summaries of the FRMPs state that under the 2018 NCCAF, sectoral and local authorities will develop sectoral and local adaptation plans, which will need to take account of flood risk[139]. To this end, local authorities should take into account the potential impacts of climate change on flooding and flood risk in their planning for local adaptation, in particular in the areas of spatial planning and the planning and design of infrastructure.[140] None of the FRMPs assessed provide further information on the specific adaptation strategies in place in their UoMs[141].

The FRMPs describe the results of long-term climate change scenarios. While the main sources of flooding are not expected to change, according to these scenarios, the FRMPs state that "climate change is likely to have a considerable impact on flood risk in Ireland, such as through rising mean sea levels, increased wave action and the potential increases in winter rainfall and intense rainfall events. Land use change, for example through new housing and other developments, can also increase potential future flood risk"[142].

The FRMPs also reference the National CFRAM Programme and parallel projects assessing risk for potential future scenarios; the Mid-Range Future Scenario (MRFS) and the High-End Future Scenario (HEFS) (see table below). It is not clear in the FRMPs what the timeframes are for these scenarios.

Table 10 Flood Parameters for the Mid-Range and High-End Future Scenarios[143]

Parameter	MRFS	HEFS
Extreme Rainfall Depths	+ 20%	+ 30%

[138] All FRMPs assessed, section 1.3.6.

[139] All FRMPs assessed, Executive Summary.

[140] All FRMPs assessed Appendix F, section F1.4.

[141] Ireland subsequently informed the European Commission that in in 2019, 12 sectors (including the flood risk management sector) published Climate Change Sectoral Adaptation Plans (available at https://www.gov.ie/en/publication/97984b-climate-change-and-sectoral-adaptation-plan/), while each local authority produced Local Adaptation Strategies.

[142] All FRMPs assessed, section 1.2.3.

[143] All FRMPs assessed, section 5.5.

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Parameter	MRFS	HEFS
Peak Flood Flows	+ 20%	+ 30%
Mean Sea Level Rise	+ 500 mm	+ 1000 mm
Land Movement	- 0.5 mm / year1	- 0.5 mm / year1
Forestation	- 1/6 Tp2	1/3 Tp2 + 10% SPR3

Note 1: Applicable to the southern part of the country only (Dublin – Galway and south of this).

Note 2: Reduction in the time to peak (Tp) to allow for potential accelerated runoff that may arise as a result of drainage of afforested land.

Note 3: Add 10% to the Standard Percentage Runoff (SPR) rate: This allows for temporary increased runoff rates that may arise following felling of forestry.

The objectives for the FRMP include one to "Ensure flood risk management options are adaptable to future flood risk, and the potential impacts of climate change" (Objective 4.c.i)[144]. As noted in section 3 above, the objectives were used (via a global and a local weighting) in the identification and assessment of proposed measures. Consequently, the FRMPs have considered climate change as a criterion for the selection of all measures, especially those measures not already in place. This means that a measure which is more adaptable to future flood risk and potential impacts of climate change can rank higher than a measure with weaker potential (although climate change is only one consideration). Measures are also considered with regard to how they can be adapted in the future (especially in the next FRMP cycle).

5.1 Specific measures planned to address climate change

According to the XML summaries, the development of flood risk management options under the CFRAM Programme, while focused primarily on existing risk, included consideration of potential future flood extents, depths and risks: these future dimensions were based on the flood mapping undertaken for two potential future scenarios based on possible future changes, including potential impacts of climate change[145].

The proposed flood management options (as noted above, “options” can include more than one measure or management method) set out in the FRMPs include an assessment of the adaptability to potential future changes[146] of the FRMPs assessed. Therefore, for each potential measure set out in Appendix G, there is a short text outlining how the measure can be modified in the future. The extent to which this section on “potential future changes” concerns climate

[144] All FRMPs assessed, section 1.4, Table 1.2.

[145] XML summaries, “Summary of Climate Change”.

[146] All FRMPs assessed, Appendix G.

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change varies across the FRMPs assessed: in some FRMPs assessed there is no mention of climate change specifically in the section[147]; in others, this is specifically identified as "Climate Change Adaptability"[148], often involving an assessment of the vulnerability of each AFA[149] and measures to mitigate changes (in most cases increasing the height of hard defences)[150].

The FRMP for IE32-33 (Erriff-Clew Bay - Blacksod-Broadhaven) includes specific information in Appendix G when describing the potential future changes of the measures set out there, for example, outlining how the Medium Range Future Scenario was used in the design of an embankment.[151] The four other FRMPs assessed did not, however, provide this level of detail when describing the potential future changes for potential measures.

All assessed FRMPs have a measure ("Measure Applicable for all Areas") requiring Local Authorities to consider climate change in their **spatial planning and the planning and design of infrastructure**[152]. In one FRMP (for IE32-33, Erriff-Clew Bay and Blacksod-Broadhaven), there is also a measure that specifically concerns construction outside but close to the Flood Zone B extent which "may be susceptible to increases in flood risk as a result of climate change": the measures suggests that applying building regulations would reduce the potential impact in the future[153].

The FRMPs do not note if other **non-structural measures** (i.e. other than spatial planning) will address climate change. For example, the FRMPs do not refer to **economic instruments (or insurance)** to address of climate change. There are several examples of **NWRMs** in the FRMPs assessed, including the use of Sustainable Urban Drainage. Other measures concerning local planning and adaptation require local authorities to consider the use of NWRMs. There is no indication in the FRMPs that these measures are directly related to climate change.

All five FRMPs assessed set out potential measures which can be adapted for climate change by constructing new or increasing the **size/capacity of existing flood defences**. There was no

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[147] See for example FRMP 25-26 Shannon Upper & Lower, "G.5 The Shannon Upper and Lower River Basin / Upper Shannon / Mohill", where the potential future change is simply described: "Can be adapted: Moderate impact on flood risk." Appendix G, p.29.

[148] FRMP 01 North Western, FRMP 09 Liffey and Dublin Bay, FRMP 19 Lee, Cork Harbour and Youghal Bay, section 7.4.

[149] FRMP 01 North Western, FRMP 09 Liffey and Dublin Bay, FRMP 19 Lee, Cork Harbour and Youghal Bay Appendix G.

[150] All FRMPs assessed, Appendix G.

[151] FRMP 32-33 Erriff-Clew Bay - Blacksod-Broadhaven Appendix G, p. 12.

[152] All FRMPs assessed, section 7.4.1.4.

[153] FRMP 32-33 Erriff-Clew Bay - Blacksod-Broadhaven, section 7.4.1.1, p. 61.

indication that these are no regret measures, and these adaptations appear to only be relevant in the next cycle of the FRMPs. There is potential for improved biodiversity and amenity value with the creation of new storage areas in one of the FRMPs assessed[154].

Two FRMPs referred to climate change specifically in relation to a potential need to increase **dredging** in rivers, as part of climate adaptability of proposed measures. In the FRMP for IE01 (North Western), there are four AFAs with moderate or high vulnerability under mid-range and high-end future scenarios considering climate change, where dredging is included as a possible future adaptation for proposed measures. This includes further localised widening and dredging of tributary channels[155], increasing the height of the hard defences and extending their length, carrying out excavation works to increase the storage volume available and further dredging and excavation, with some bank raising to increase the channel conveyance[156], and increasing culvert and channel capacity[157].

The FRMP for IE09 (Liffey and Dublin Bay) states that for a moderately vulnerable AFA (mid-range and high-end future scenarios), the proposed measure would require further improvement of **channel conveyance** by replacing or underpinning the currently proposed improvements[158].

There are no specific measures to reduce pollution risk in flood prone zones.

5.2 Good practices and areas for further development concerning climate change

The following **good practices** were identified:

- Climate change plays a large role in the FRMPs, which are linked to the National Adaptation Framework and which include a specific objective (Objective 4.c.i) on adaptation.
- The FRMPs moreover set out the potential impacts of climate change on flood risks.
- All assessed FRMPs have a measure ("Measure Applicable for all Areas") requiring Local Authorities to consider climate change in their spatial planning and the planning and design of infrastructure[159].

[154] FRMP 09 Liffey and Dublin Bay 7.4.6.

[155] FRMP 01 North Western, section 7.4.3, p. 79.

[156] FRMP 01 North Western, section 7.4.7, p. 83, section 7.4.10, p. 87.

[157] FRMP 01 North Western, section 7.4.16, p. 98.

[158] FRMP 09 Liffey and Dublin Bay, section 7.4.5, p. 91.

[159] All FRMPs assessed, section 7.4.1.4.

- Each measure and potential measure includes an assessment of how it can be adapted in the future in response to climate change.

The following **area for further development** was identified:

- Most of the references to climate adaptation are for measures that focus on infrastructure, for the most part the raising of flood barriers[160].

[160] Ireland subsequently informed that the 2019 Change Sectoral Adaptation Plan (CCSAP) for flood risk management notes that non-structural measures are inherently more adaptable than structural measures.

6. Cost-benefit analysis

Options for the application of measures at area and local level were developed through a screening process, involving professional experience and judgement, informed and guided by local knowledge and suggestions. The aim of the process was to develop potentially viable options that incorporated one or, more often, a combination of flood risk management methods. These options were subject to multi-criteria analysis (MCA) and cost-benefit analysis (CBA), the latter being part of an economic appraisal. This approach was applied consistently across all the FRMPs. The use of the terms "option" (which can include more than one measure or management method), "management methods" and "measure" are used interchangeably within the FRMPs and this is reflected in the text below[161].

The FRMPs (Section 7.3.2 of the plans) state that a screening process was first undertaken at a catchment and AFA spatial scale to filter out flood risk management methods (both structural and non-structural) that would not be able to provide applicable, acceptable or viable measures for managing flood risk, either alone or in combination with other methods for a given area or location. The methods were screened based on an initial assessment of their effectiveness in managing or reducing flood risk and on the basis of economic, environmental, social, and cultural criteria.

Under the economic criteria, reference is made in the plans to the use of simple costing using 'unit costs' to inform an indicative benefit-cost ratio for a method, in isolation or in potential combination with other methods, although no further details are provided in the plans. Further details are provided in the Preliminary Options reports[162]. The Preliminary Options report for the Liffey and Dublin Bay (IE09, Section 5.11), for example, defines the economic benefit derived from a flood alleviation measure as the difference in the present value of damages before and after the measure is put in place. The cost of each option was calculated by combining the construction and maintenance costs of the flood risk management methods making up the option and then applying a cost for preliminaries (e.g. the cost of administering the project and providing plant, site staff, facilities and site-based services) other items and optimism bias (the tendency to consider that the chances of experiencing negative effects are lower) (Section 7.2.3). A benefit cost ratio (BCR) was calculated. Options with a BCR of 0.5 or greater were considered potential options and continued in the assessment. The BCR

[161] Ireland subsequently explained that a 'management method' comprises one approach to managing flood risk. A range of 'management methods' may be included in one 'option' or 'potential measure'. A number of 'options' are considered and appraised for a given flood risk problem, with the preferred option representing the 'measure' as published in the FRMPs.

[162] https://www.fl oodinfo.ie/publications/?t=21

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threshold of 0.5 was set to allow options which are apparently not cost beneficial to progress with a view that if they are considered during a detailed study, the options costs may be reduced as uncertainties in relation to site specific conditions are ruled out or mitigated.

The outcome of the screening process was a set of flood risk management methods that might form, alone or in combination, potentially viable options for flood risk management measures.

Following the screening process, potentially viable options were appraised by a Multi-Criteria Analysis (MCA) to determine their effectiveness in reducing flood risk and their potential benefits and impacts across the objectives, which cover economic, environmental and technical aspects (see Section 2.1 of this report). Each option is given a benefit score for each specific objective. Under the economic analysis within the MCA, performance of the measure against Objective 2a (see table in Section 2.1), 'Reduce economic damages' is given a benefit score based on reduction in annual average damage against a baseline. In addition to this score a separate CBA is carried out against objective 2a, the results of which are reported separately from the MCA for each option. Therefore, all candidate measures that passed the screening process were subject to an MCA and a CBA.

Under the economic appraisal, CBA was undertaken on each potential option to determine the most suitable flood risk management options. The assessment of possible flood risk management measures has been undertaken at a range of spatial scales, namely the whole RBD, at a catchment or sub-catchment scale, or at an AFA or local level to determine whether a measure may benefit multiple areas or AFAs, and also to determine the potential impacts of measures elsewhere in the catchment (e.g. up- and down-stream).

The CBA approach sets out a common approach to the calculation of monetised, economic flood damages, and the economic benefits of flood risk management options to ensure that damages, benefits and benefit-cost calculations are determined in a nationally consistent manner, allowing the comparison of proposed measures across Ireland. CBA was carried out to determine the economic viability of each option for each area or location. It is not stated within the plans how many of such assessments were carried out, but this implies that at least tens or possibly up to a hundred CBAs were carried out per plan.

Preferred measures were determined through consideration of (Section 7.3.7 of the FRMPs) of the economic benefit-cost ratio alongside: the MCA benefit-cost ratio (see below); environmental considerations and assessments; the adaptability to possible future changes, such as the potential impacts of climate change; professional experience and judgement of the OPW, local authorities and consultants, and; public and stakeholder input and opinion.

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It is worth clarifying at this point that two Benefit-Cost ratios are reported separately for the options evaluated post screening:

- **MCA Benefit-Cost Ratio (herein referred to as M-BCR):** where the MCA Benefit Score is divided by the cost of the option to provide a numerical, but non-monetised, MCA Benefit-Cost Ratio that provides an indication of the overall benefits that can be delivered per Euro invested.
- **The Economic Benefit-Cost Ratio (herein referred to as E-BCR):** calculated using the more traditional CBA techniques where benefits are monetised.

Appendix G in each of the FRMPs assessed contains details of each of the measures (e.g. "Progress the development of a flood relief scheme for Ballybofey and Stranorlar AFA"[163]) considered, including the presentation of results from the multi-criteria analysis (M-BCR) and the benefit-cost ratio (E-BCR) calculated as part of the economic appraisal (the M-BCR and E-BCR are reported separately for each measure/option). Where a proposed measure has an E-BCR 'below unity' then these are no longer considered viable or will be subject to a more detailed assessment to determine whether an economically viable measure may exist (this was the case, for example, for measures in the Celbridge AFA and the Hazelhatch AFA of the FRMP for IE09, Liffey and Dublin Bay[164]). Where the BCR for a measure is above unity then the measure is progressed (e.g. Clane AFA, FRMP 09 Liffey and Dublin Bay [165]).

Ireland's Reporting Sheets note that, for 125 measures, the estimated costs and benefits of the proposed measure, and the number of properties to be protected, are provided in Appendix G of the FRMP. The benefits are calculated in terms of the Net Present Value of Damages avoided, based on accumulated, discounted damages (the discount rate applied was 4%) over 50 years[136].

The MCA covers benefits associated with meeting social, economic, environmental and technical flood risk management objectives and therefore considers multiple benefits. In the separate technical note on CBA[166] referenced in the plans (Section 7.3.5 of the FRMPs, for the calculation of E-BCR) it is stated that the economic benefits of an option for a flood risk management measure are calculated as the reduction in the economic damages the option or measure will provide. It is stated that environmental damage (among others) is not considered in the economic appraisal of options as they are either not economic losses and/or a relatively

[163] FRMP 01 North Western, Appendix G, page 1.

[164] FRMP 09 Liffey and Dublin Bay, section 7.4.4. page 90.

[165] FRMP 09 Liffey and Dublin Bay, section 7.4.5. page 90.

[166] CFRAM Technical Methodology Note on Cost-Benefit Analysis (CBA), https://www.gov.ie/en/publication/b15dd0-technical-specifications-and-guidance-notes/

small as a percentage of the overall damage. Multiple benefits are not therefore considered within the CBA.

The MCA approach and CBA (under objective 2a 'Reduce economic damages', see above) was applied primarily to structural measures (such as hard flood defences, amendments to existing defences, improving channel conveyance, flow diversion, embankments) at the AFA or local level although non-structural measures (such as flood forecasting and warning) are included in MCA scoring system. Section 6.6 (page 13) of the technical methodology note entitled 'Option Appraisal and the Multi-Criteria Analysis (MCA) Framework[167]' states that certain non-structural flood risk management measures are required as matters of national policy. These include the application of national guidelines on the planning system and flood risk management, emergency response plans for severe weather events. The methodology states that these measures are required to be applied regardless of other proposed measures, or of the outcomes of an appraisal under the MCA process, therefore they do not need to be subjected to an MCA appraisal, but may be assumed to be applicable and required for all AFAs.

At a broader scale, flood risk management measures applicable at the river basin level are generally non-structural measures already in-place or mandated under existing legislation or policy. Indeed, the review of the FRMPs revealed that only a limited number of options were considered to be applicable at the catchment level. The FRMPs assessed also identify options that are considered as 'applicable for all areas' forming part of wider government policy (and therefore not subject to MCA or CBA).

6.1 Good practices and areas for further development

The following **good practice** was identified:

- Ireland has established a clear and detailed procedure for cost-benefit analysis, which was coordinated nationally to ensure a consistent approach in all UoMs.
- Economic, environmental and social benefits are not considered in cost-benefit analysis but are used for a multi-criteria analysis (MCA) where these are presented as scores and therefore not monetised; a MCA benefit score is divided by the cost of a particular measure or set of measures to provide a numerical, but non-monetised, MCA Benefit-Cost Ratio that provides an indication of the overall benefits that can be delivered per Euro invested.

The following **area for further development** was identified:

[167] CFRAM Technical Methodology Note Option Appraisal and the Multi-Criteria Analysis (MCA) Framework https://www.gov.ie/en/publication/b15dd0-technical-specifications-and-guidance-notes/

- The approach to CBA did not include a broader consideration of benefits, for example via multi-benefit analysis. It was focused on an economic appraisal with the assessment being based on reduction in economic damages and consideration of intangible and indirect damages[168].

[168] Ireland subsequently noted that a project to review the appraisal process with regards to the inclusion of a wider range of benefits, including social, environmental and public realm, into the appraisal process was recently publicly advertised for tender (E-Tenders, 01/05/2020, External Reference: 2020-231511, TED Reference: 2020/S 088-210349).

7. Governance including administrative arrangements, public information, and consultation

7.1 Competent authorities

Based on the FRMPs and the information provided in the reporting sheets, there has been no change in the Competent Authority identified for the FD, which is the Office of Public Works.

7.2 Public information and consultation

The table below shows how the public and interested parties were **informed** in the five UoMs assessed concerning the draft FRMPs. Information on how the consultation was actually carried out and which stakeholders participated is presented in the rest of the section.

Table 11 Methods used to inform the public and interested parties of the FRMP

	FRMP 01 North Western	FRMP 09 Liffey and Dublin Bay	FRMP 19 Lee, Cork Harbour and Youghal Bay	FRMP 25-26 Shannon Upper & Lower	FRMP 32-33 Erriff-Clew Bay - Blacksod-Broadhaven
Media (papers, TV, radio)[169]		✓			
Internet	✓	✓	✓	✓	✓
Digital social networking					
Printed material					
Direct mailing					
Invitations to stakeholders	✓	✓	✓	✓	✓
Local Authorities					
Meetings	✓	✓	✓	✓	✓
Other: Newsletters	✓	✓	✓	✓	✓

Source: FRMPs

Section 4 of each of the FRMPs assessed is dedicated to the consultation process. This section outlines the statutory national consultations on the flood risk maps and draft FRMPs, and also the additional national consultations undertaken on Flood Risk Management Objectives and options assessments. A website for the National Catchment Flood Risk Assessment and

[169] Ireland subsequently noted that, whilst not explicitly mentioned in the FRMPs, the public consultation on all FRMPs was advertised in national newspapers.

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Management Programme and the PFRA was established in 2011, and each of the FRMPs assessed also states that project specific websites for the RBD specific CFRAM studies were developed and included information on the Floods Directive, the PFRA and the CFRAM Programme: the website provided access to view and download the flood maps and reports, the FRMPs and other project outputs[170]. This relevant information is now available from the OPW website[171].

FRMP 09 Liffey and Dublin Bay, FRMP 25-26 Shannon Upper & Lower, FRMP 32-33 Erriff-Clew Bay - Blacksod-Broadhaven mentioned that public events were held to launch the projects and to inform people of the progress that had taken place.

- The FRMP for IE09 (Liffey and Dublin Bay) notes that the Eastern CFRAM project was launched with a public open evening event attended by homeowners, landowners, elected members and members of non-governmental organisations. Attendees had seen or heard newspaper and radio adverts on the date of the event or were informed by a local elected representative, or had seen the event advertised on a local authority website[172].
- The FRMP for IE25 and IE26 (Shannon Upper & Lower) states that public open days were held to inform people of progress and outline the next steps. Events were also held to identify public priorities with regards to risk management[173].
- The FRMP for IE32-33 (Erriff-Clew Bay and Blacksod-Broadhaven) notes that a stakeholder workshop was held in addition to making information available to the public on the project website and through project newsletters[174].

In each of the FRMPs a diagram is provided which gives an overview of the CFRAM consultation stages and structures. In each of these, the methods of public information highlighted were: newsletters, project websites and Q&As (questions and answers – no further details provided)[175].

The table below shows how the actual **consultation** was carried out:

[170] Section 4.2 of all FRMPS; IE01 page 33; IE09 page 40; IE19 page 35; IE25-26 page 36; IE32-33 page 27.

[171] www.floodinfo.ie.

[172] Section 4.4.2 page 44.

[173] Section 4.4.2 page 39.

[174] Section 4.4.2 Page 30.

[175] IE01 page 34; IE09 page 42; IE19 page 37; IE25-26 page 37; IE32-33 page 28.

Table 12 Methods used for the actual consultation

	FRMP 01 North Western	FRMP 09 Liffey and Dublin Bay	FRMP 19 Lee, Cork Harbour and Youghal Bay	FRMP 25-26 Shannon Upper & Lower	FRMP 32-33 Erriff-Clew Bay - Blacksod-Broadhaven
Via Internet	✓	✓	✓	✓	✓
Via digital social networking					
Direct invitation	✓	✓	✓	✓	✓
Exhibitions					
Workshops, seminars or conferences	✓	✓	✓	✓	✓
Telephone surveys					
Direct involvement in drafting FRMP					
Other – formal presentation to councils, public consultation days	✓	✓	✓	✓	✓

Source: FRMPs

In each FRMP assessed it is stated that public consultations were held on flood maps, flood risk management objectives, options assessments and the draft FRMPs. Draft flood maps were consulted upon through a national statutory consultation[176] and local public consultation days, held where possible (and appropriate) in each AFA[177].

Public consultation days were held at local level during the assessment and development of options for reducing or managing flood risk (the FRMPs refer to "options", which can include more than one measure or management method) as an opportunity for the public to set out what local issues were important and comment on which options might be effective and appropriate or otherwise[178].

In each FRMP it is stated that the consultation on the Flood Risk Management Objectives of the national CFRAM Programme was held by the OPW. Information provided in the reporting sheets stated that the public consultation on objectives was advertised in the national media and via the National CFRAM Stakeholder Group. OPW also commissioned a national independent poll of over 1000 members of the public which used a structured questionnaire to

[176] The Government considered it appropriate to stipulate in SI No. 122 of 2010 (Sections 12, 13 and 14) that a national consultation exercise should be undertaken.

[177] All FRMPs assessed, section 4.4.3.

[178] All FRMPs assessed, section 4.4.4 or 4.4.5.

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explore views on the weightings to be given to each objective[179]. The results of the poll informed the national weightings given to each objective.

In each of the FRMPs assessed there is a sub-section dedicated to the consultation on the draft plans themselves[180]. These consisted of a formal public consultation process which invited opinion from the public and relevant councils (though no further information on this is given) and a series of public consultation days similar to those held on the flood maps. These were attended by elected representatives and members of the public.

Finally, the FRMPs include a section on the further public consultation that will be held on the implementation of proposed measures in the Plan during the project development stage. The methods to be used include public information days to inform local communities of progress on the design of proposed schemes, formal consultation on scheme documents and the consultation and engagement of national stakeholders on the national programme[181].

The table below shows how the **documents** for the FRMP consultation were provided:

Table 13 Methods used to provide the documents for the consultation

	FRMP 01 North Western	FRMP 09 Liffey and Dublin Bay	FRMP 19 Lee, Cork Harbour and Youghal Bay	FRMP 25-26 Shannon Upper & Lower	FRMP 32-33 Erriff-Clew Bay - Blacksod-Broadhaven
Downloadable	✓	✓	✓	✓	✓
Direct mailing (e-mail)					
Direct mailing (post)					
Paper copies distributed at exhibitions	✓	✓	✓	✓	✓
Paper copies available in municipal buildings (town hall, library etc.)	✓	✓	✓	✓	✓
Other: provided at public consultation days	✓	✓	✓	✓	✓

Source: FRMPs

[179] All FRMPs assessed, section 4.4.4.

[180] All FRMPs assessed, section 4.4.5 or 4.4.6.

[181] All FRMPs assessed section 8.1.4. I.

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7.3 Active involvement of Stakeholders

The table below shows the groups of **stakeholders** that have been actively involved in the development of the five FRMPs assessed:

Table 14 Groups of stakeholders actively involved in the development of the five FRMPs assessed

	FRMP IE01 North Western	FRMP IE09 Liffey and Dublin Bay	FRMP IE19 Lee, Cork Harbour and Youghal Bay	FRMP IE25-26 Shannon Upper & Lower	FRMP IE32-33 Erriff-Clew Bay - Blacksod-Broadhaven
Civil Protection Authorities such as government departments responsible for emergency planning and coordination of response actions	✓	✓	✓	✓	✓
Flood Warning / Defence Authorities*				✓	
Drainage Authorities*					
Emergency services*					
Water supply and sanitation	✓	✓	✓	✓	✓
Agriculture / farmers	✓	✓	✓	✓	✓
Energy / hydropower	✓	✓	✓	✓	✓
Navigation / ports	✓	✓	✓	✓	✓
Fisheries / aquaculture	✓		✓	✓	✓
Private business (Industry, Commerce, Services)	✓	✓	✓	✓	✓
NGO's including nature protection, social issues (e.g. children, housing)*	✓	✓		✓	✓
Consumer Groups					
Local / Regional authorities	✓	✓	✓	✓	✓
Academia / Research Institutions					
Other					

Source: FRMPs

*Note: * These organisations were involved as members of the National CFRAM Stakeholder Group*

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Both the FRMPs and the reporting sheet summaries provide information on public and stakeholder engagement during the development of the FRMPs. Approaches were largely similar in each of the FRMPs assessed, likely due to the coordination at the national level. Both national and regional stakeholder groups were established in Ireland. The National CFRAM Stakeholder Group provided for the engagement of key national non-governmental stakeholder organisations at key stages in the process of the implantation of the national CFRAM programme[182] (All FRMPs section, section 4.3.2: 38). The regional groups were established to provide for the engagement of local non-governmental stakeholder organisations at key stages in the process of the implementation of the regional CFRAM projects.

National groups included:

- The National CFRAM Steering Group, which was established in 2009 and which met on nine occasions to the date of publication of the Plans. It was established to provide for the engagement of key Government Departments and other state stakeholders in guiding the direction and the process of the implementation of the 'Floods' Directive, including the National CFRAM Programme. Its members were the following[183]:
  - Office of Public Works
  - County and City Managers Association
  - Dept. of Housing, Planning and Local Government
  - Dept. of Agriculture, Food and the Marine
  - Dept. of Culture, Heritage and the Gaeltacht
  - Environmental Protection Agency
  - Electricity Supply Board
  - Geological Survey of Ireland (Dept. of Communications, Climate Action and Environment)
  - Irish Water
  - Met Éireann
  - Office of Emergency Planning
  - Rivers Agency (Northern Ireland)
  - Waterways Ireland
- The National CFRAM Stakeholder Group was established in 2014 and met three times to the date of publication of the Plans. It was established to provide for the engagement of key national non-governmental stakeholder organisations at key stages in the process of the implementation of the National CFRAM Programme. These organisations included the Irish Wildlife trust, Coastwatch Ireland, Sustainable Water Network and

[182] All FRMPs assessed, section 4.3.2.

[183] FRMP 25-26 Shannon Upper & Lower, Appendix D1.

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the Irish National Flood Forum. Full details of organisations invited to these meetings can be found in Appendix D3 of each of the FRMPS.

Regional groups[184] included:

- A Project Steering Group which included senior representatives of the members, 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.
- The Project Progress Group - a working group that supported the Project Steering Group - was established for each CFRAM Project 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 and the preparation of the FRMP.
- A Project CFRAM Stakeholder Group was established in 2012 and met on five occasions to the date of publication of the Plans. 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 CFRAM Project. The organisations listed in Appendix D.4 of the FRMP attended meetings of this Group, although many other organisations were also invited to attend.

As seen in Table 14, the stakeholders active in the five FRMPs assessed were broadly similar. Differences arose from the attendance at regional steering and stakeholder groups[185]. One difference was the inclusion of flood alleviation authorities in the FRMP for IE25-26 (Shannon Upper & Lower), which attended the Shannon CFRAM stakeholder workshops. (It can be noted that, in addition, this was the only FRMP assessed that mentions the involvement of a pharmaceuticals company among private business in the stakeholder workshops[186].)

The table below shows the **mechanisms** used to ensure the active involvement of stakeholders:

[184] Ireland had eight regions until 2014, when they were merged into three regional assemblies. The FRMPs do not specify but it is believed that these regional groups were at the level of the three regional assemblies.

[185] All FRMPs assessed, Appendix D2 and D3.

[186] FRMP 09 Liffey and Dublin Bay Appendix D4.

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Table 15 Mechanisms used to ensure the active involvement of stakeholders

	FRMP IE01 North Western	FRMP IE09 Liffey and Dublin Bay	FRMP IE19 Lee, Cork Harbour and Youghal Bay	FRMP IE25-26 Shannon Upper & Lower	FRMP IE32-33 Erriff-Clew Bay - Blacksod-Broadhaven
Regular exhibitions					
Establishment of advisory groups	✓	✓	✓	✓	✓
Involvement in drafting					
Workshops and technical meetings	✓	✓	✓	✓	✓
Formation of alliances					
Other					

Source: FRMPs

Regarding mechanisms to ensure the active involvement of stakeholders, as already discussed, regular meetings of both national and regional steering groups and stakeholders were established, along with regional progress groups to ensure the continued communication between key stakeholders and the CFRAM Project and to support the successful implementation of the Project[187].

The CFRAM Project Progress Groups were working groups that met approximately every six weeks. The Project Steering Groups met approximately twice a year[188].

7.4 Effects of consultation

The table below shows the effects of consultation:

Table 16 Effects of consultation

	All UoMs assessed
UoM / APSFR / other flood risk area Code	
Changes to selection of measures	✓
Adjustment to specific measures	✓
Addition of new information	
Changes to the methodology used	

[187] All FRMPs assessed, section 4.3.1.3.

[188] All FRMPs assessed, section 4.3.1.

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	All UoMs assessed
Commitment to further research	✓
Commitment to action in the next FRMP cycle	✓
Other – Amendment to the plan, other than an amendment to a specific measure	✓
Other- An amendment in relation to the environmental assessments, such as the consideration of additional mitigation and/or monitoring measures.	✓
Other- Changes to the extent of AFAs (APSFRs)	✓

In each of the FRMPs it is made clear that the observations submitted to the OPW through the public consultation processes were considered and the plans amended where appropriate. A synopsis of observations and amendments made to the plan arising from the consultations is not available in the FRMPs, but a separate report is available from the OPW website[189]. According to this document, the Summary Report on the Public Consultations on the Draft Flood Risk Management Plans, the actions taken across the UoMs have included (but are not limited) to:

- A review of the measures concerned and amendment of the measures set out in the draft Plan.
- A review of the proposed measures 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 measures, and a decision that the measures 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.
- The issue raised was noted but it was considered appropriate that no action should be taken. A clarification relating to the issue raised has been included in Section 3, where appropriate.

[189] http://s3-eu-west-1.amazonaws.com/docs.floodinfo.opw/floodinfo_docs/Public_Consultation_Summary_Report.pdf

Full details of comments submitted during the consultation process across all UoMs along with the relevant responses area are not available in the FRMPs themselves but are available in the Summary Report on the Public consultations[190].

7.5 Strategic Environmental Assessment

Each of the FRMPs assessed has been subject to a Strategic Environmental Assessment (SEA), and, where necessary, Plan-level Appropriate Assessment (AA) under the Habitats Directive, to determine the potential benefits and impacts of the Plans on the environment, and to identify mitigation and monitoring measures necessary to avoid or minimise such impacts. SEAs are covered in section 6.3 of the FRMPS[191].

The OPW carried out an SEA Screening in 2011 for all the CFRAM Studies in Ireland and determined that SEA of the FRMPs would be required.

An SEA Scoping Report, an SEA Scoping Summary Report, an Environmental Constraints Report and a table of High Level Impacts of FRM Methods were produced in 2015 as part of the scoping phase of the SEA for each of the FRMPs assessed. All SEA Scoping documentation was made available to the public and formal consultations were undertaken with statutory bodies, local authorities and project stakeholders. All SEA reports are available from www.floodinfo.ie.

Three of the five FRMPs assessed note that the objectives of the FRMPs were matched to the SEA Directive requirements. These FRMPs also describe how the SEA further informed the development of the Plans through the recommendation of mitigation measures to minimise or eliminate any potential negative environmental impacts of the options and the recommendation of environmental monitoring, to measure any wider environmental impacts of the Plan[192]. Two FRMPs (FRMP 19 Lee, Cork Harbour and Youghal Bay and FRMP 25-26 Shannon Upper and Lower) contain a description of the steps taken to produce the SEA[193].

[190] http://s3-eu-west-1.amazonaws.com/docs.floodinfo.opw/floodinfo_docs/Public_Consultation_Summary_Report.pdf

[191] FRMP 01 North Western page 53; FRMP 09 Liffey & Dublin Bay page 61; FRMP 19 Lee, Cork Harbour & Youghal Bay page 59; FRMP 25-26 Shannon Upper and Lower page 58; FRMP 32-33 Erriff - Clew Bay - Blacksod – Broadhaven page 43.

[192] FRMP 01 North Western, FRMP 09 Liffey & Dublic Bay, FRMP 32-33 Erriff - Clew Bay - Blacksod – Broadhaven, section 6.3.

[193] FRMP 19 Lee, Cork Harbour & Youghal Bay and FRMP 25-26 Shannon Upper and Lower, section 6.3.

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7.6 Good practices and areas for further development regarding Governance

The following **good practices** were identified:

- An overall approach to consultation and engagement on FRMPs was followed throughout the country with variations, for example in the stakeholders participating in the CFRAM Project Stakeholder Groups and in the number of public consultation events held, providing a balance between national consistency and local relevance.
- Early and extensive stakeholder involvement was coordinated through national and regional steering and stakeholder groups.
- Regional Progress Groups were established to ensure regular communication between key stakeholders and the CFRAM Project and to support the successful implementation of the Project and the preparation of the FRMP. These met approximately every six weeks.
- The public consultation involved a wide range of stakeholders and consisted of provision of information at both national and regional levels and local Public Consultation Days at all Areas for Further Assessment (AFAs), as far as possible and appropriate. Over 200 local Public Consultation Days were held across the country between 2013-2016194.
- An independent poll of over 1000 members of the public (assumed to be nationally) was carried out which used a structured questionnaire to explore views on the weightings to be given to each objective.
- A separate report provides information about the written comments and recommendations from the public consultations and indicates how they were taken into account in the finalisation of the FRMP.

The following **area for further development** was identified:

- Information provision, especially the online information made available to the public, appears to have relied on standard technical maps and documents which may be difficult for non-technical audiences to engage with[195].

[194] All FRMPs assessed, section 4.3, Figure 4.1.

[195] Ireland subsequently noted that public consultation days were held in the relevant communities (Section 4.4. of the FRMPS) to provide for face-to-face meetings between the project team and the public and stakeholders. This was specifically intended such that any technical concepts, maps and documents could be explained to the public and stakeholders in a manner to promote understanding and engagement.

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Annex A: Supplementary tables and charts on measures

This Annex gives an overview of the data on measures provided by Ireland in the reporting sheets. These tables and charts were used for the preparation of section 4 on measures.

Background & method

This document was produced as part of the assessment of the Flood Risk Management Plans (FRMPs). The tables and charts below are a summary of the data reported on measures by the Member States and were used by the Member State assessor to complete the questions on the Flood measures. The data are extracted from the XMLs (Reporting Sheets) reported by Member States for each FRMP, and are split into the following sections:

- **Measures overview** – Tabulates the number of measures for each UoM;
- **Measure details: cost** – Cost & Cost explanation;
- **Measures details: name & location** – Location & geographic coverage;
- **Measure details: authorities** – Name of responsible authority & level of responsibility;
- **Measure details: objectives** – Objectives, Category of priority & Timetable;
- **Measure details: progress** – Progress of implementation & Progress description;
- **Measure details: other** – Other Community Acts.

On the basis of the reporting guidance (which in turn is based on the Floods Directive)[196], not all fields are mandatory, and, as such, not all Member States reported information for all fields.

Some of the fields in the XMLs could be filled in using standardised answers – for example, progress is measured via the categories set out in the Reporting Guidance. This means that producing comprehensive tables and charts required little effort. For many fields, however, a free data format was used. For some Member States, this resulted in thousands of different answers, or answers given in the national language.

In such situations, tables and charts were developed using the following steps:

- A first filter is applied to identify how many different answers were given. If a high number of different answers are given, Member States assessors were asked to refer to the raw data when conducting the assessment, and this Annex does not reflect these observations.

[196] http://icm.eionet.europa.eu/schemas/dir200760ec/resources

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- If a manageable number of answers are given, obvious categories are identified, and raw data sorted.
- Measures missing information may be assigned categories based on other fields (for example, if the level of Responsibility Authority is missing, the information may be obvious from the field "name of Responsible Authority").
- Measures where obvious categories cannot be defined based on other available information (as in the example on the name of the Responsible Authority, above), are categorised as "no information".

Types of measures used in reporting

The following table[197] is used in the reporting on the types of measures. Each type of measures is coded as an M-number. Measures are grouped in an 'aspect'.

Table A1 Types of measures used in reporting

NO ACTION M11: No Action	**PREPAREDNESS** M41: Flood Forecasting & Warning M42: Emergency response planning M43: Public Awareness M44: Other preparedness
PREVENTION M21: Avoidance M22: Removal or relocation M23: Reduction M24: Other prevention	**RECOVERY & REVIEW** M51: Clean-up, restoration & personal recovery M52: Environmental recovery M53: Other recovery
PROTECTION M31: Natural flood management M32: Flow regulation M33: Coastal and floodplain works M34: Surface Water Management M35: other protection	**OTHER MEASURES** M61: Other measures

[197] Guidance for Reporting under the Floods Directive (2007/60/EC): https://circabc.europa.eu/w/browse/a3c92123-1013-47ff-b832-16e1caaafc9a/

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List of Annex A tables and figures

Measures overview

Table A2 Number of measures reported in the reporting sheets

Number of individual measures	276
Number of individual measures including measures which have been allocated to more than one measure type	0
Number of aggregated measures	325
Number of aggregated measures including measures which have been allocated to more than one measure type	0
Total number of measures	601
Total number of measures including measures which have been allocated to more than one measure type	0
Range of number of measures between UoMs including measures which have been allocated to more than one measure type (Min-Max)	13-68
Average number of measures across UoMs including measures which have been allocated to more than one measure type	24

Table A3 Number of individual measures per measure type and UoM

	Prevention		Protection				Prepa-redness	Other	Grand Total
	M23	M24	M32	M33	M34	M35	M41	M61	
GBNIIENB		2		5		1		1	9
GBNIIENW		5		13	1	1		2	22
IE07		1		5		1	1		8
IE08		2		3					5
IE09		4		38	3	2			47
IE10		3		8				1	12
IE12				4					4
IE14	1	3		9					13
IE15	1	3		6		1			11
IE16		1		14		1			16
IE17				2					2
IE18		1		7		1			9
IE19		2		14		1	2		19
IE20		1		4		2			7
IE21				3					3
IE22				2		3			5
IE29				4			3		7
IE30		1		3					4

	Prevention		Protection				Prepa-redness	Other	Grand Total
	M23	M24	M32	M33	M34	M35	M41	M61	
IE31							1		1
IE32-33		2		2			3		7
IE34	1	2		2			2		7
IE35		1	1				1		3
IEGBNISH		3		48		4			55
Grand Total	**3**	**37**	**1**	**196**	**4**	**18**	**13**	**4**	**276**
Average	0	2	0	9	0	1	1	0	12

Notes: Recovery and Review measures were reported as Preparedness measures. There were no measures with Code M51-M53 reported.

Table A4 Number of aggregated measures per measure type and UoM

	Prevention			Protection		Preparedness			Other	Grand Total
	M21	M22	M24	M31	M34	M41	M42	M43	M61	
GBNIIENB	1	1	4	1	1	1	1	2	1	13
GBNIIENW	1	1	4	1	1	1	1	2	1	13
IE07	1	1	4	1	1	1	1	2	1	13
IE08	1	1	4	1	1	1	1	2	1	13
IE09	1	1	4	1	1	1	1	2	1	13
IE10	1	1	4	1	1	1	1	2	1	13
IE11	1	1	4	1	1	1	1	2	1	13
IE12	1	1	4	1	1	1	1	2	1	13
IE13	1	1	4	1	1	1	1	2	1	13
IE14	1	1	4	1	1	1	1	2	1	13
IE15	1	1	4	1	1	1	1	2	1	13
IE16	1	1	4	1	1	1	1	2	1	13
IE17	1	1	4	1	1	1	1	2	1	13
IE18	1	1	4	1	1	1	1	2	1	13
IE19	1	1	4	1	1	1	1	2	1	13
IE20	1	1	4	1	1	1	1	2	1	13
IE21	1	1	4	1	1	1	1	2	1	13
IE22	1	1	4	1	1	1	1	2	1	13
IE29	1	1	4	1	1	1	1	2	1	13
IE30	1	1	4	1	1	1	1	2	1	13
IE31	1	1	4	1	1	1	1	2	1	13
IE32-33	1	1	4	1	1	1	1	2	1	13
IE34	1	1	4	1	1	1	1	2	1	13
IE35	1	1	4	1	1	1	1	2	1	13
IEGBNISH	1	1	4	1	1	1	1	2	1	13

Grand Total	**25**	**25**	**100**	**25**	**25**	**25**	**25**	**50**	**25**	**325**
Average	**1**	**1**	**4**	**1**	**1**	**1**	**1**	**2**	**1**	**13**

Notes: Recovery and Review measures were reported as Preparedness measures. There were no measures with Code M51-M53 reported.

Table A5 Total number of measures (aggregated and individual) per measure type and UoM

	Prevention		Prevention Total	Preparedness		Preparedness Total	Protection		Protection Total	Other		Other Total	Grand Total
	Aggregated	Individual		Aggregated	Individual		Aggregated	Individual		Aggregated	Individual		
GBNIIENB	6	2	8	4		4	2	6	8	1	1	2	22
GBNIIENW	6	5	11	4		4	2	15	17	1	2	3	35
IE07	6	1	7	4	1	5	2	6	8	1		1	21
IE08	6	2	8	4		4	2	3	5	1		1	18
IE09	6	4	10	4		4	2	43	45	1		1	60
IE10	6	3	9	4		4	2	8	10	1	1	2	25
IE11	6		6	4		4	2		2	1		1	13
IE12	6		6	4		4	2	4	6	1		1	17
IE13	6		6	4		4	2		2	1		1	13
IE14	6	4	10	4		4	2	9	11	1		1	26
IE15	6	4	10	4		4	2	7	9	1		1	24
IE16	6	1	7	4		4	2	15	17	1		1	29
IE17	6		6	4		4	2	2	4	1		1	15
IE18	6	1	7	4		4	2	8	10	1		1	22
IE19	6	2	8	4	2	6	2	15	17	1		1	32
IE20	6	1	7	4		4	2	6	8	1		1	20
IE21	6		6	4		4	2	3	5	1		1	16
IE22	6		6	4		4	2	5	7	1		1	18
IE29	6		6	4	3	7	2	4	6	1		1	20
IE30	6	1	7	4		4	2	3	5	1		1	17
IE31	6		6	4	1	5	2		2	1		1	14

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	Prevention		Prevention Total	Preparedness		Preparedness Total	Protection		Protection Total	Other		Other Total	Grand Total
	Aggregated	Individual		Aggregated	Individual		Aggregated	Individual		Aggregated	Individual		
IE32-33	6	2	8	4	3	7	2	2	4	1		1	20
IE34	6	3	9	4	2	6	2	2	4	1		1	20
IE35	6	1	7	4	1	5	2	1	3	1		1	16
IEGBNISH	6	3	9	4		4	2	52	54	1		1	68
Grand Total	**150**	**40**	**190**	**100**	**13**	**113**	**50**	**219**	**269**	**25**	**4**	**29**	**601**
Average	6	2	8	4	1	5	2	9	11	1	0	1	24

Notes: Recovery and Review measures were reported as Preparedness measures. There were no measures with Code M51-M53 reported.

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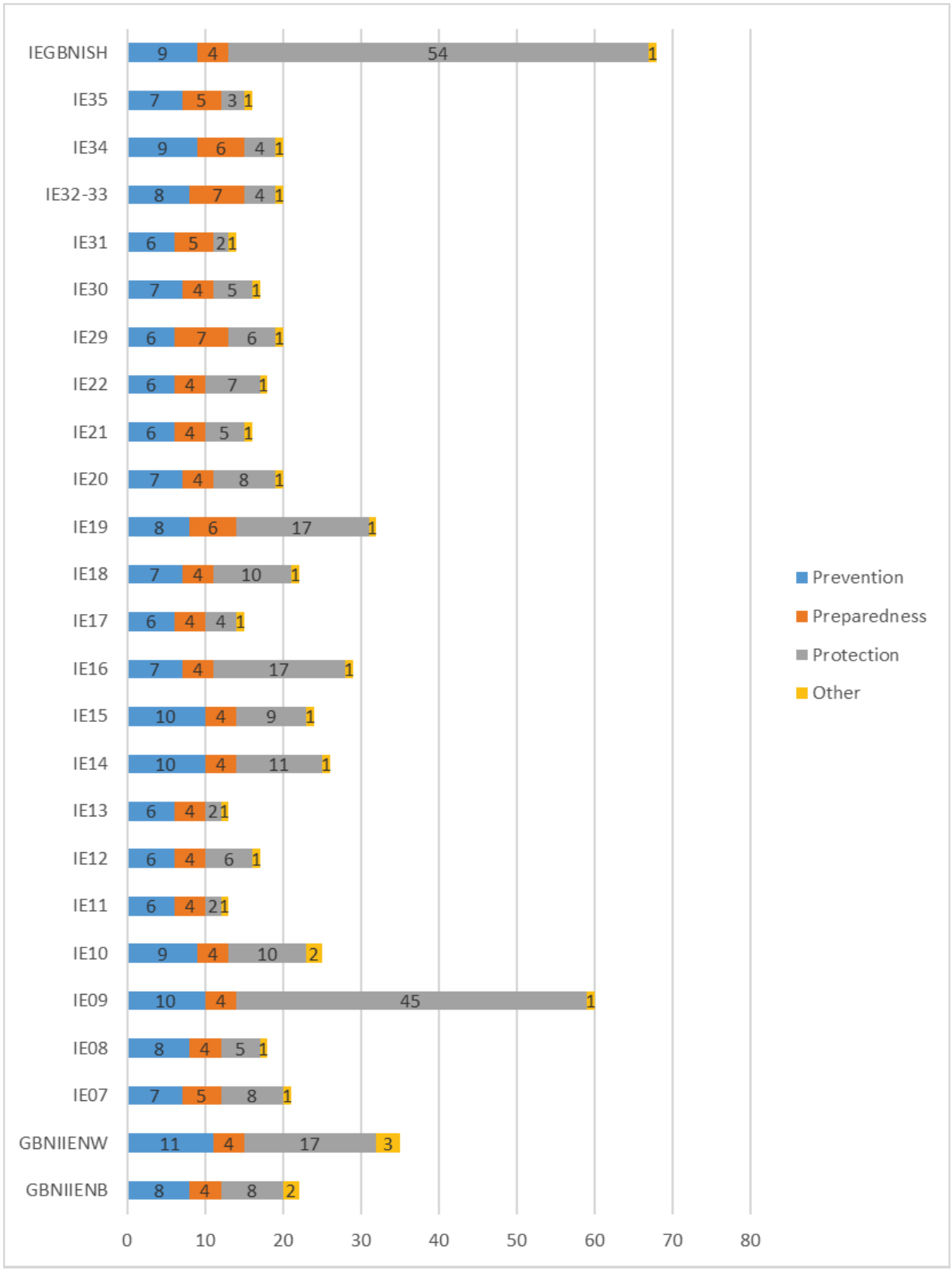
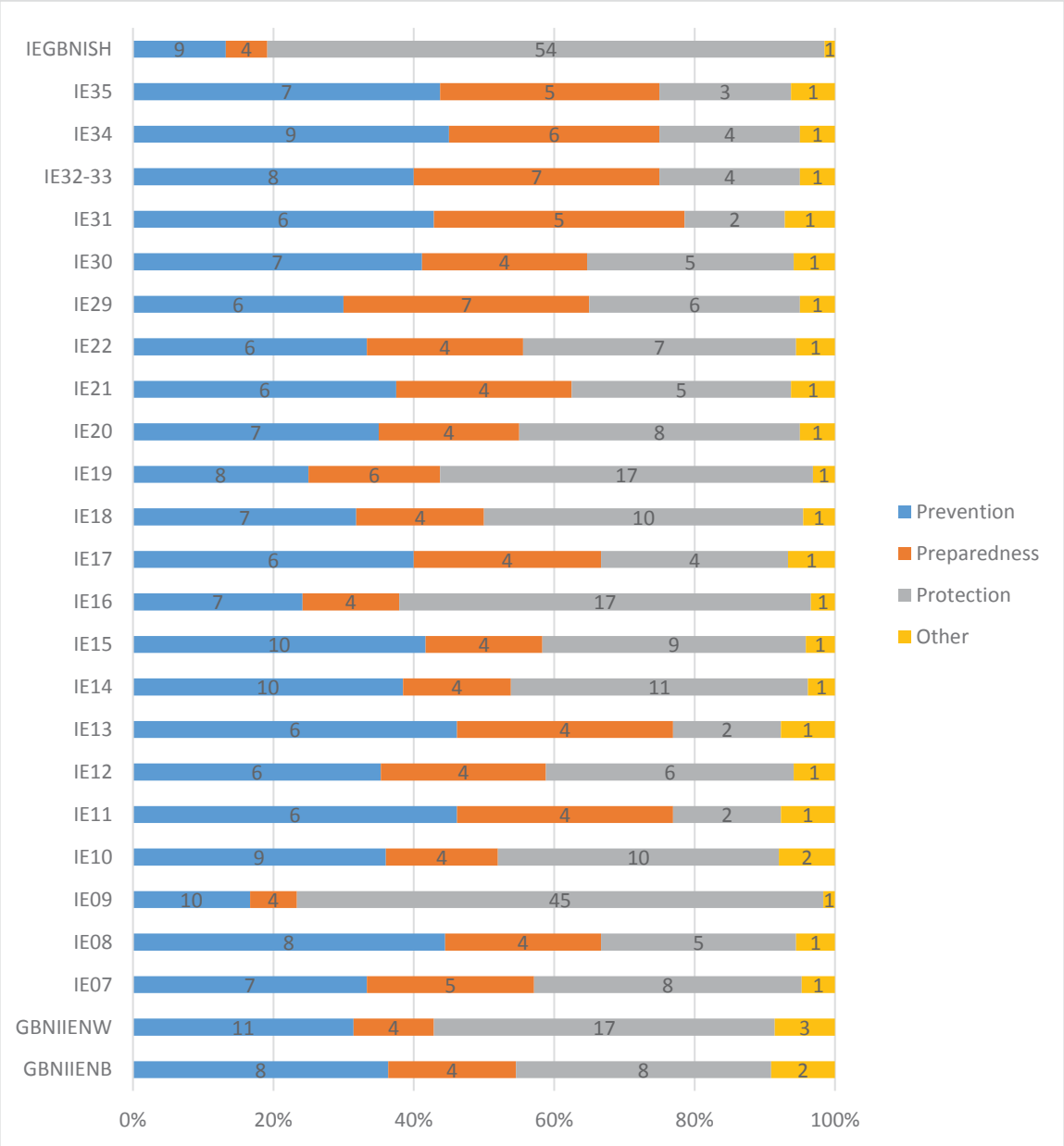
The information in Tables A3, A4 and A5 is visualised in Figures A1 and A2 below:

Figure A1 Number of total measures (individual and aggregate) by measure aspect



Notes: Recovery and Review measures were reported as Preparedness measures. There were no measures with Code M51-M53 reported.

Figure A2 Share of total measures (aggregated and individual) by measure aspect



Notes: Recovery and Review measures were reported as Preparedness measures. There were no measures with Code M51-M53 reported.

Measure details: cost

Member States were requested to report information on:

- Cost (optional field);
- Cost explanation (optional field).

Ireland provided the following information for 125 out of 601 measures: "Estimated costs (€) and benefits (€NPVb) of the proposed measure, and the number of properties to be protected, are provided in Appendix G of the FRMP". These are the same measures that have information regarding objective reported. No information was reported for the cost explanation, nor for the remaining measures.

Measure details: name & location

Member States were requested to report information on the following:

- Location of implementation of measures (mandatory field);
- Geographic coverage of the impact of measures (optional field).

Location of measures

For all measures the location was reported. These responses were categorised as either UoMs, AFA/APSFRs, or "other" when either the AFA code was not given or it was specifically stated that the measure is specifically "not an AFA".

Table A6 Location of implementation by measure aspect

	APSFR	UoM	Other	Grand Total
Prevention	38	150	2	190
Preparedness	13	100		113
Protection	211	50	8	269
Other	4	25		29
Grand Total	**266**	**325**	**10**	**601**

Notes: Locations described as "Other" are those locations with no AFA or UoM code. Recovery and Review measures were reported as Preparedness measures. There were no measures with Code M51-M53 reported.

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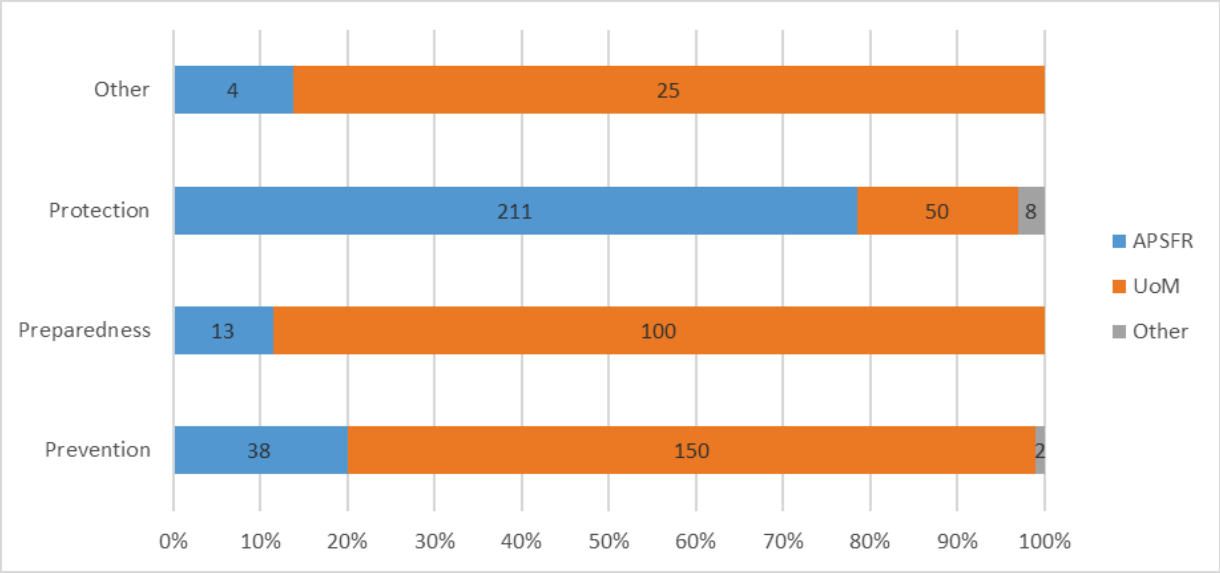
Figure A3 Visualisation of Table A6: Location by measure aspect



Notes: Locations described as "Other" are those locations with no AFA or UoM code

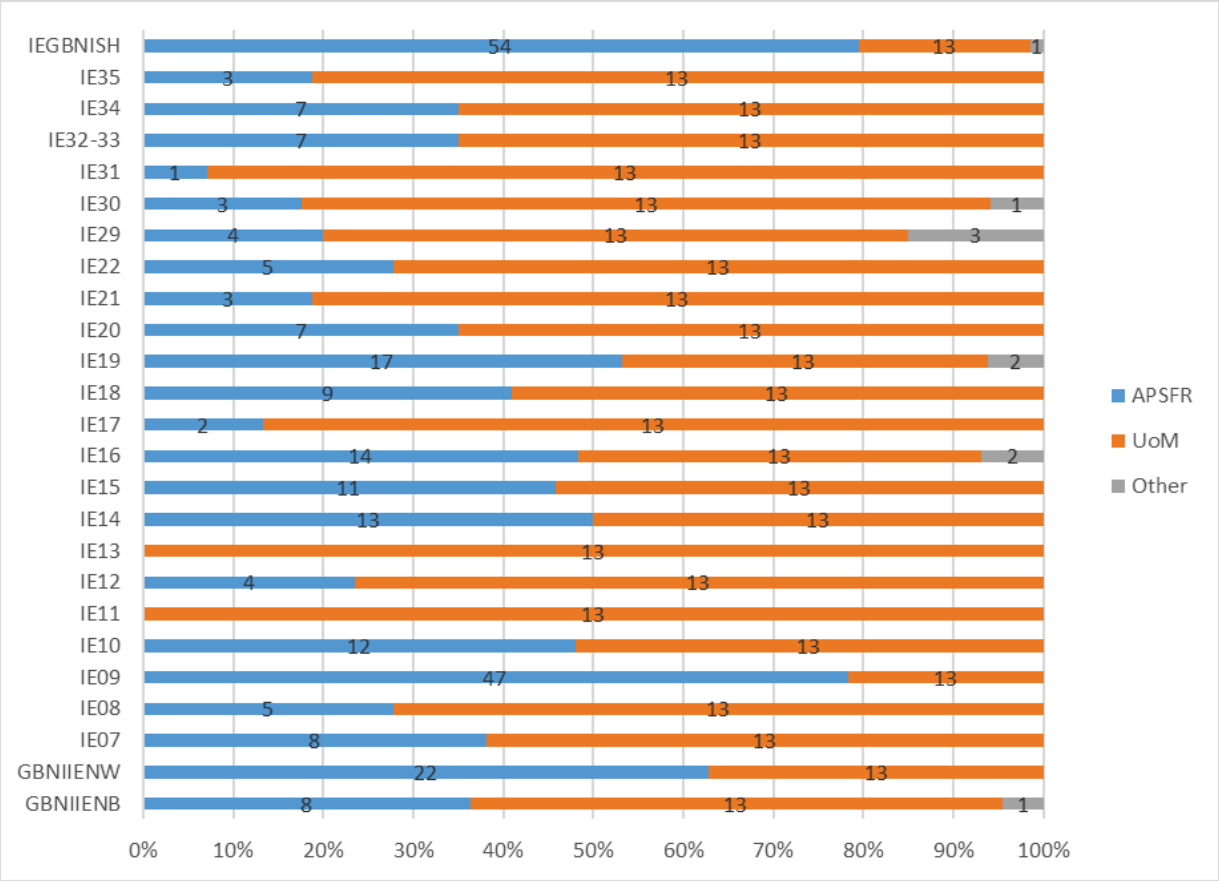
Table A7 Location of implementation by UoM

	APSFR	UoM	Other	Grand Total
GBNIIENB	8	13	1	22
GBNIIENW	22	13		35
IE07	8	13		21
IE08	5	13		18
IE09	47	13		60
IE10	12	13		25
IE11		13		13
IE12	4	13		17
IE13		13		13
IE14	13	13		26
IE15	11	13		24
IE16	14	13	2	29
IE17	2	13		15
IE18	9	13		22
IE19	17	13	2	32
IE20	7	13		20
IE21	3	13		16
IE22	5	13		18
IE29	4	13	3	20
IE30	3	13	1	17
IE31	1	13		14
IE32-33	7	13		20
IE34	7	13		20
IE35	3	13		16

	APSFR	UoM	Other	Grand Total
IEGBNISH	54	13	1	68
Grand Total	**266**	**325**	**10**	**601**
Average	11	13	0	24

Notes: Locations described as "Other" are those locations with no AFA or UoM code

Figure A4 Visualisation of Table A7: Location by UoM



Notes: Locations described as "Other" are those locations with no AFA or UoM code

Geographic coverage

No information reported in the reporting sheets.

Measure details: objectives

Member States were requested to report information on:

- Objectives linked to measures (optional field, complementary to the summary provided in the textual part of the XML);

- Category of priority (Conditional, reporting on either ‘category of priority’ or ‘timetable’ is required);
- Timetable (Conditional, reporting on either ‘category of priority’ or ‘timetable’ is required).

Objectives

The Guidance Document indicates that for each measure, an “Explanation of how the measure contributes to the objectives” can be provided (this is an optional field).

Information was reported for 125 measures. In each case, the following text was reported: “Measure was appraised against the Objectives using a Multi-Criteria Analysis (Refer to Section 7.3 of FRMP). The performance of the measure in contributing to the achievement of each of the Objectives is set out in Appendix G of the FRMP (Un-Weighted Score, on a scale of -5 up to +5, with an explanation for the assignment of each score provided under 'Comment'). The overall benefit of the measure in relation to the Objectives is provided as the Total MCA-Benefit Score.”

Category of priority

Ireland did not report the category of priority; however, a “summary” was reported for all measures:

- This measure is already completed.
- This measure is already underway.
- This measure, which requires further assessment or hydrometric monitoring before progression to further development at a local, project level, will be implemented and progressed in parallel with the first tranche of schemes.
- The proposed measures comprising structural flood protection schemes are to be prioritised based on a number of criteria. A number of schemes will be identified to progress as a first tranche, which will include: (a) Large schemes (more than €15m), given their scale and long-lead-in time to balance resources and capacity, (b) a number of Medium Schemes (between €0.75m and €15m) that provide protection to the greatest number of properties within each of six geographical regions, (c) Small Schemes (<€0.75m) that can be advanced locally by the local authorities, and (d) Other schemes where local authorities have the capacity to deliver the measures. Approximately 50 Schemes will progress as a first tranche. The remaining schemes can progress thereafter as a second tranche. The OPW will monitor progress of all schemes and publish an

annual plan of works of both existing capital works programme and progress with works proposed in the Flood Risk Management Plans.
- To progress as part of the development of the National Flood Forecasting Service.

It is therefore not clear what the prioritisation of each measure is.

Timetable

No information has been reported on the timetable.

Measure details: authorities

Member States were requested to report information on:

- Name of the responsible authority (optional if 'level of responsibility' is reported);
- Level of responsibility (optional if 'name of the responsible authority' is reported).

The name of the responsible authority was reported for all measures. From this, it was possible to categorise the authorities into the following groups:

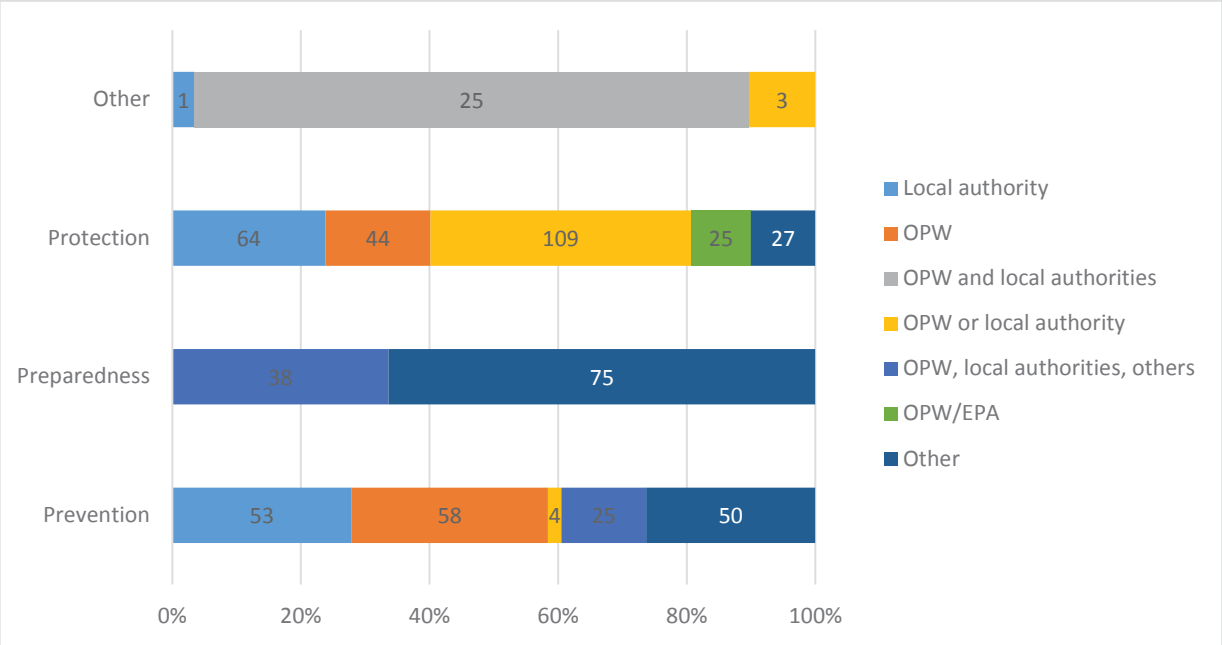
- Local authority
- OPW
- OPW and local authorities
- OPW or local authority
- OPW, local authorities, others
- OPW/EPA
- Other

Table A8 Level of responsibility by measure aspect

	Local Authority	OPW	OPW and local authority	OPW or local authority	OPW, local authorities, others	OPW/EPA	Other	Grand Total
Prevention	53	58		4	25		50	190
Preparedness					38		75	113
Protection	64	44		109		25	27	269
Other	1		25	3				29
Grand Total	**118**	**102**	**25**	**116**	**63**	**25**	**152**	**601**

Notes: Recovery and Review measures were reported as Preparedness measures. There were no measures with Code M51-M53 reported.

Figure A5 Visualisation of Table A8: Level of responsibility by measure aspect



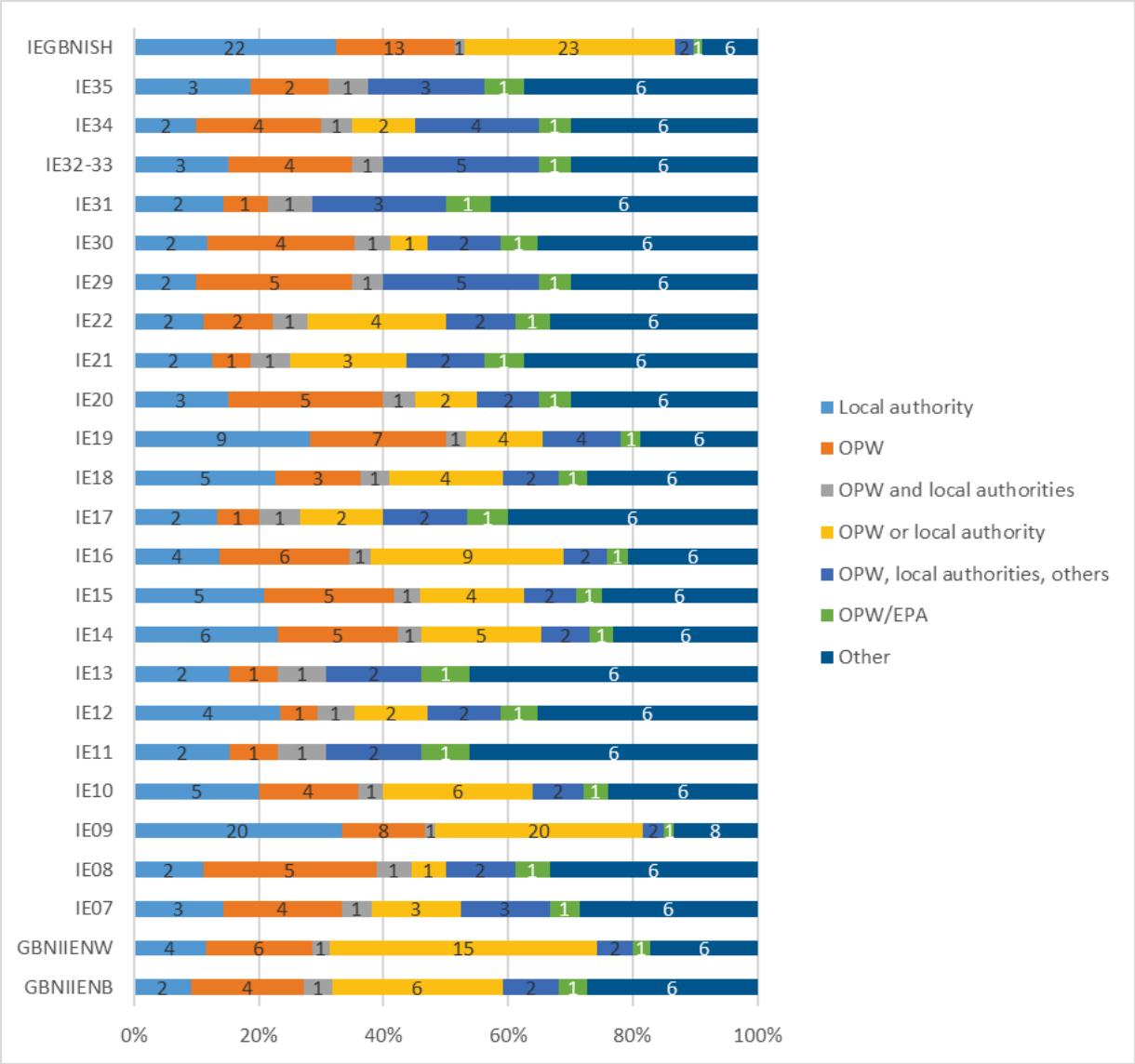
Notes: Recovery and Review measures were reported as Preparedness measures. There were no measures with Code M51-M53 reported.

Table A9 Level of responsibility by UoM

	Local autho-rity	OPW	OPW and local authorities	OPW or local authority	OPW, local authorities, others	OPW /EPA	Othe r	Grand Total
GBNIIE NB	2	4	1	6	2	1	6	22
GBNIIE NW	4	6	1	15	2	1	6	35
IE07	3	4	1	3	3	1	6	21
IE08	2	5	1	1	2	1	6	18
IE09	20	8	1	20	2	1	8	60
IE10	5	4	1	6	2	1	6	25
IE11	2	1	1		2	1	6	13
IE12	4	1	1	2	2	1	6	17
IE13	2	1	1		2	1	6	13
IE14	6	5	1	5	2	1	6	26
IE15	5	5	1	4	2	1	6	24
IE16	4	6	1	9	2	1	6	29
IE17	2	1	1	2	2	1	6	15
IE18	5	3	1	4	2	1	6	22
IE19	9	7	1	4	4	1	6	32

	Local autho-rity	OPW	OPW and local authorities	OPW or local authority	OPW, local authorities, others	OPW /EPA	Othe r	Grand Total
IE20	3	5	1	2	2	1	6	20
IE21	2	1	1	3	2	1	6	16
IE22	2	2	1	4	2	1	6	18
IE29	2	5	1		5	1	6	20
IE30	2	4	1	1	2	1	6	17
IE31	2	1	1		3	1	6	14
IE32-33	3	4	1		5	1	6	20
IE34	2	4	1	2	4	1	6	20
IE35	3	2	1		3	1	6	16
IEGBNISH	22	13	1	23	2	1	6	68
Grand Total	**118**	**102**	**25**	**116**	**63**	**25**	**152**	**601**
Average	5	4	1	5	3	1	6	24

Figure A6 Visualisation of Table A9: Level of responsibility by UoM



Measure details: progress

Member States were requested to report information on:

- Progress of implementation of measures (mandatory field) – this is a closed question whose responses are analysed below;
- Progress description of the implementation of measures (optional field) – this is an open text question for which not all MS reported and whose answers are not analysed here.

Ireland reported information about the progress of implementation of the measures. The progress of implementation was reported as[198]:

- COM (completed);
- OGC (ongoing construction);
- POG (progress ongoing);
- NS (not started).

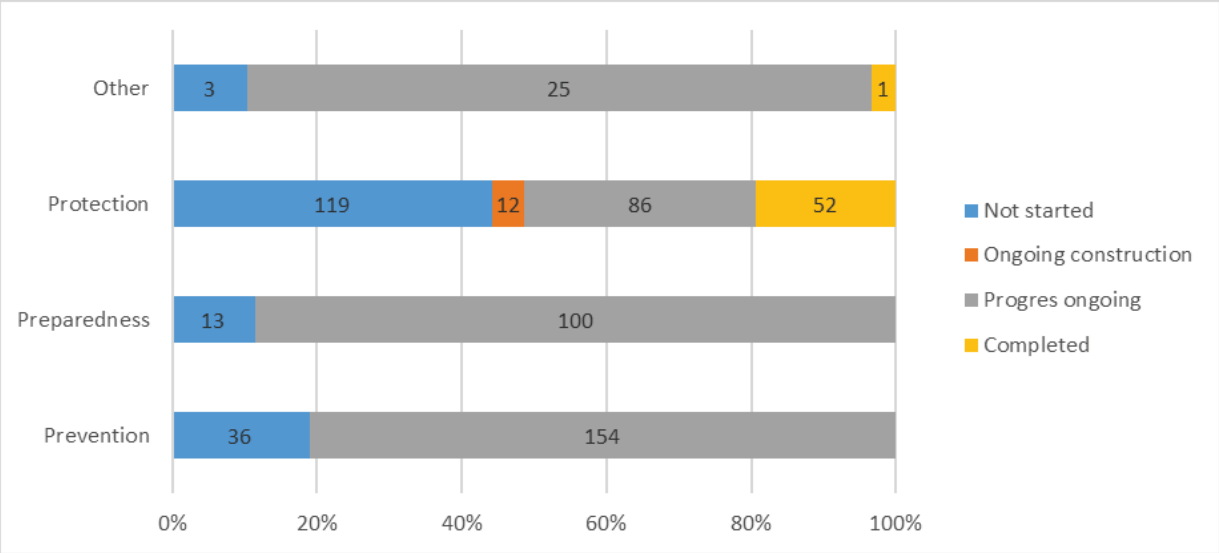
A full definition of these terms can be found at the end of this section.

Table A10 Progress of implementation by measure aspect

	Not started	Ongoing construction	Progress ongoing	Completed	Grand Total
Prevention	36		154		190
Preparedness	13		100		113
Protection	119	12	86	52	269
Other	3		25	1	29
Grand Total	**171**	**12**	**365**	**53**	**601**

Notes: Recovery and Review measures were reported as Preparedness measures. There were no measures with Code M51-M53 reported.

Figure A7 Visualisation of Table A9: Progress of implementation by measure aspect



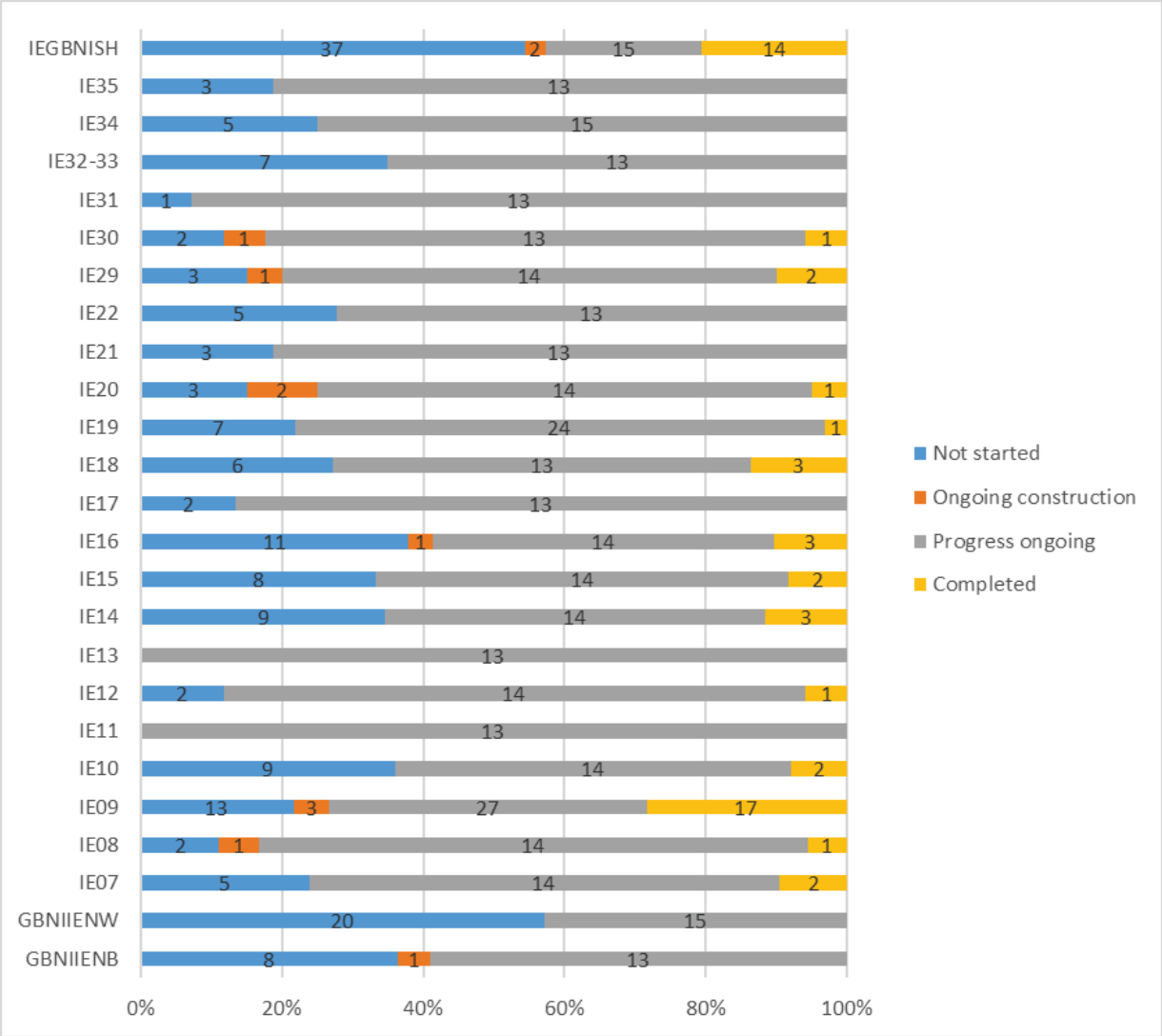
Notes: Recovery and Review measures were reported as Preparedness measures. There were no measures with Code M51-M53 reported.

[198] Guidance for Reporting under the Floods Directive (2007/60/EC): https://circabc.europa.eu/w/browse/a3c92123-1013-47ff-b832-16e1caaafc9a

Table A11 Progress of implementation by UoM

	Not started	Ongoing construction	Progress ongoing	Completed	Grand Total
GBNIIENB	8	1	13		22
GBNIIENW	20		15		35
IE07	5		14	2	21
IE08	2	1	14	1	18
IE09	13	3	27	17	60
IE10	9		14	2	25
IE11			13		13
IE12	2		14	1	17
IE13			13		13
IE14	9		14	3	26
IE15	8		14	2	24
IE16	11	1	14	3	29
IE17	2		13		15
IE18	6		13	3	22
IE19	7		24	1	32
IE20	3	2	14	1	20
IE21	3		13		16
IE22	5		13		18
IE29	3	1	14	2	20
IE30	2	1	13	1	17
IE31	1		13		14
IE32-33	7		13		20
IE34	5		15		20
IE35	3		13		16
IEGBNISH	37	2	15	14	68
Grand Total	**171**	**12**	**365**	**53**	**601**
Average	7	0	15	2	24

Figure A8 Visualisation of Table A11: Progress of implementation by UoM



The categories describing the progress of measures are defined in the EU Reporting Guidance Document on the Floods Directive:

For **measures involving construction or building works** (e.g. a wastewater treatment plant, a fish pass, a river restoration project, etc.):

- Not started (NS) means the technical and/or administrative procedures necessary for starting the construction or building works have not started.
- Progress on-going (POG) means that administrative procedures necessary for starting the construction or building works have started but are not finalised. The simple inclusion in the RBMPs is not considered planning in this context.
- On-going construction (OGC) means the construction or building works have started but are not finalized.
- Completed (COM) means the works have been finalised and the facilities are

operational (maybe only in testing period in case e.g. a wastewater treatment plant).

For measures involving advisory services (e.g. training for farmers):

- Not started (NS) means the advisory services are not yet operational and have not provided any advisory session yet.
- Progress on-going (POG) means the advisory services are operational and are being used. This is expected to be the situation for all multi- annual long/mid-term advisory services that are expected to be operational during the whole or most of RBMP cycle.
- On-going construction (OGC): Not applicable
- Completed (COM) means an advisory service that has been implemented and has been finalised, i.e. is no longer operational. This is expected only for advisory services that are relatively short term or one-off, and which duration is time limited in relation to the whole RBMP cycle.

For measures involving research, investigation or studies:

- Not started (NS) means the research, investigation or study has not started, i.e. contract has not been signed or there has not been any progress.
- Progress on-going (POG) means the research, investigation or study has been contracted or started and is being developed at the moment.
- On-going construction (OGC): Not applicable
- Completed (COM) means the research, investigation or study has been finalised and has been delivered, i.e. the results or deliverables are available (report, model, etc.).

For measures involving administrative acts (e.g. licenses, permits, regulations, instructions, etc.):

- Not started (NS) means the administrative file has not been opened and there has not been any administrative action as regards the measure.
- Progress on-going (POG) means an administrative file has been opened and at least a first administrative action has been taken (e.g. requirement to an operator to provide information to renew the licensing, request of a permit by an operator, internal consultation of draft regulations, etc.). If the measure involves more than one file, the opening of one would mean already "ongoing".
- On-going construction (OGC): Not applicable
- Completed (COM) means the administrative act has been concluded (e.g. the license or permit has been issued; the regulation has been adopted, etc.). If the measure involves more than one administrative act, "completed" is achieved only when all of

them have been concluded.

Measure details: other

Member States were requested to report information on:

- Other Community Acts associated to the measures reported (optional field);
- Any other information reported (optional field).

Ireland did not report any other information.

Annex B: Definitions of measure types

Table B1 Types of flood risk management measures199

No Action	
M11	No Action, No measure is proposed to reduce the flood risk in the APSFR or other defined area,
Prevention	
M21	Prevention, Avoidance, Measure to prevent the location of new or additional receptors in flood prone areas, such as land use planning policies or regulation
M22	Prevention, Removal or relocation, Measure to remove receptors from flood prone areas, or to relocate receptors to areas of lower probability of flooding and/or of lower hazard
M23	Prevention, Reduction, Measure to adapt receptors to reduce the adverse consequences in the event of a flood, actions on buildings, public networks, etc...
M24	Prevention, Other prevention, Other measure to enhance flood risk prevention (may include, flood risk modelling and assessment, flood vulnerability assessment, maintenance programmes or policies etc...)
Protection	
M31	Protection Natural flood management / runoff and catchment management, Measures to reduce the flow into natural or artificial drainage systems, such as overland flow interceptors and / or storage, enhancement of infiltration, etc and including in-channel, floodplain works and the reforestation of banks, that restore natural systems to help slow flow and store water.
M32	Protection, Water flow regulation, Measures involving physical interventions to regulate flows, such as the construction, modification or removal of water retaining structures (e.g., dams or other on-line storage areas or development of existing flow regulation rules), and which have a significant impact on the hydrological regime.
M33	Protection, Channel, Coastal and Floodplain Works, Measures involving physical interventions in freshwater channels, mountain streams, estuaries, coastal waters and flood-prone areas of land, such as the construction, modification or removal of structures or the alteration of channels, sediment dynamics management, dykes, etc.
M34	Protection, Surface Water Management, Measures involving physical interventions to reduce surface water flooding, typically, but not exclusively, in an urban environment, such as enhancing artificial drainage capacities or though sustainable drainage systems (SuDS).
M35	Protection, Other Protection, Other measure to enhance protection against flooding, which may include flood defence asset maintenance programmes or policies
Preparedness	
M41	Preparedness, Flood Forecasting and Warning, Measure to establish or enhance a flood forecasting or warning system
M42	Preparedness, Emergency Event Response Planning / Contingency planning, Measure to establish or enhance flood event institutional emergency response planning
M43	Preparedness, Public Awareness and Preparedness, Measure to establish or enhance the public awareness or preparedness for flood events

199 Guidance for Reporting under the Floods Directive (2007/60/EC): https://circabc.europa.eu/w/browse/a3c92123-1013-47ff-b832-16e1caaafc9a/

M44	Preparedness, Other preparedness, Other measure to establish or enhance preparedness for flood events to reduce adverse consequences
Recovery & Review	
M51	Recovery and Review (Planning for the recovery and review phase is in principle part of preparedness), Individual and societal recovery, Clean-up and restoration activities (buildings, infrastructure, etc), Health and mental health supporting actions, incl. managing stress Disaster financial assistance (grants, tax), incl. disaster legal assistance, disaster unemployment assistance, Temporary or permanent relocation, Other
M52	Recovery and Review, Environmental recovery, Clean-up and restoration activities (with several sub-topics as mould protection, well-water safety and securing hazardous materials containers)
M53	Recovery and Review, Other, Other recovery and review Lessons learnt from flood events Insurance policies
Other	
M61	Other

Catalogue of Natural Water Retention Measures (NWRM)

NWRM cover a wide range of actions and land use types. Many different measures can act as NWRM, by encouraging the retention of water within a catchment and, through that, enhancing the natural functioning of the catchment. The catalogue developed in the NWRM project represents a comprehensive but non prescriptive wide range of measures, and other measures, or similar measures called by a different name, that could also be classified as NWRM.

To ease access to measures, the catalogue of measures hereunder is sorted by the primary land use type in which it was implemented: Agriculture; Forest; Hydromorphology; Urban. Most of the measures, however, can be applied to more than one land use type.

Table B2 List of NWRMs

Agriculture	Forest	Hydro Morphology	Urban
A01 Meadows and pastures	F01 Forest riparian buffers	N01 Basins and ponds	U01 Green Roofs
A02 Buffer strips and hedges	F02 Maintenance of forest cover in headwater areas	N02 Wetland restoration and management	U02 Rainwater Harvesting
A03 Crop rotation	F03 Afforestation of reservoir catchments	N03 Floodplain restoration and management	U03 Permeable surfaces
A04 Strip cropping along contours	F04 Targeted planting for 'catching' precipitation	N04 Re-meandering	U04 Swales
A05 Intercropping	F05 Land use conversion	N05 Stream bed re-naturalization	U05 Channels and rills
A06 No till agriculture	F06 Continuous cover forestry	N06 Restoration and reconnection of seasonal streams	U06 Filter Strips

Agriculture	Forest	Hydro Morphology	Urban
A07 Low till agriculture	F07 'Water sensitive' driving	N07 Reconnection of oxbow lakes and similar features	U07 Soakaways
A08 Green cover	F08 Appropriate design of roads and stream crossings	N08 Riverbed material renaturalisation	U08 Infiltration Trenches
A09 Early sowing	F09 Sediment capture ponds	N09 Removal of dams and other longitudinal barriers	U09 Rain Gardens
A10 Traditional terracing	F10 Coarse woody debris	N10 Natural bank stabilisation	U10 Detention Basins
A11 Controlled traffic farming	F11 Urban forest parks	N11 Elimination of riverbank protection	U11 Retention Ponds
A12 Reduced stocking density	F12 Trees in Urban areas	N12 Lake restoration	U12 Infiltration basins
A13 Mulching	F13 Peak flow control structures	N13 Restoration of natural infiltration to groundwater	
	F14 Overland flow areas in peatland forests	N14 Re-naturalisation of polder areas	

Source: www.nwrm.eu