OPW
Oifig na nOibreacha Poiblí
Office of Public Works

The Review of the National Preliminary Flood Risk Assessment

August 2019

EXECUTIVE SUMMARY

Background

The National Preliminary Flood Risk Assessment (PFRA), that was a requirement of the EU 'Floods' Directive, was undertaken in 2011 and then completed in 2012 after public consultation. The PFRA was a national screening of flood risk in Ireland to inform the identification of areas or communities at potentially significant flood risk. These communities, referred to as 'APSFRs', were the focus of the National Catchment-based Flood Risk Assessment and Management (CFRAM) Programme. This report outlines the Review of the PFRA has been undertaken as part of the second cycle of implementation of the Floods Directive.

The direction and scope of the Review was determined by the OPW in consultation with National 'Floods' Directive Coordination Group, with oversight provided through the Interdepartmental Flood Policy Coordination Group, taking into account:

- Historic Flood Risk Assessment: An analysis of floods that have happened since the completion of the PFRA (i.e., from 2012 to 2018)
- Predictive Flood Risk Assessment: The processes and outcomes of the PFRA and the National CFRAM Programme
- Consultation: A review of the outcomes of consultation undertaken
- Climate Change: Consideration of the potential impacts of climate change

The Review includes an assessment of the APSFRs designated under the PFRA, and of the need for the designation of other APSFRs.

Historic Flood Risk Assessment

The historic flood risk assessment involves an analysis of floods that have happened over recent years (2012 – 2018 inclusive), including their location and impacts. Some major flood events with severe and widespread impacts have taken place during this period, including the floods arising from the winter storms of 2013-14 and 2015-16, as well as some localised, intense storms such as the floods over the Inishowen Peninsula and in Mountmellicjk in 2017.

In total, data on 870 flood events that occurred during this period were collated and assessed. Of these, just over half of the floods events had occurred outside of communities designated as APSFRs in the first cycle. However, 85% of the over 4,000 properties recorded as having flooded are within the communities previously designated as APSFRs. This indicates that the designation of the 300 APSFRs in the first cycle, and the coverage of assessment of the National CFRAM Programme, were inclusive and comprehensive in terms of the areas where there is a significant risk from flooding.

Maintaining the definition of a 'significant' past flood event from the PFRA, 16 such events occurred during the period 2012-18; all of which were within previously designated APSFRs.

Predictive Flood Risk Assessment

The predictive flood risk assessment involves the estimation of risk based on calculations of flood extents and depths for floods that are predicted to occur with a given probability or frequency, and of the damages and impacts such floods would cause.

As part of the PFRA, indicative, predictive flood maps were developed, or used where already available from other sources, to enable a predictive assessment of flood risk. The conclusions of the PFRA predictive flood risk assessment informed the identification of the 300 APSFRs (AFAs) in the first cycle that became the focus of the National CFRAM Programme.

The detailed and extensive flood mapping produced under the CFRAM provides much more reliable information on flood extents and depths, relative to the assessment under the PFRA, which was then used to assess the flood risk in each of the previously designated APSFRs. The analysis under the CFRAM Programme has identified a number of communities previously designated APSFRs where the risk was found to be low and/or where protection measures cannot be justified. While ongoing observation and review of the risk for these communities is required (e.g., in relation to potentially rising risk due to the potential impacts of climate change), it is not necessary to maintain these areas as APSFRs.

Consultation

Consultation, particularly with knowledgeable stakeholders such as the local authorities, is an important mechanism for providing or validating information on flooding and flood risk from past floods and/or predictive assessments. Extensive public consultation and engagement with relevant stakeholders has been undertaken from 2011 to date through formal coordination / steering groups, stakeholder groups, presentations to Councils, informal consultation and liaison, public consultation days and through national public consultations. These have included consultations on the PFRA (2011), on the flood maps (2015-16) and on the FRMPs (2016). The submissions made and outcomes of these consultations have been taken into account and informed the assessments and mapping of flood risk and the Review of the PFRA.

Consideration of Climate Change

Article 14(4) of the 'Floods' directive requires that, in the second and subsequent cycles of implementation, the '*likely impact of climate change on the occurrence of floods shall be taken into account in the [Review of the PFRA]*'. The potential impacts of climate change have been assessed through the ICPSS and in detail for the 300 APSFRs through the National CFRAM Programme. It has been determined that the potential impacts of climate change can increase flood risk in Ireland very significantly in the future, particularly in coastal areas. These impacts will however evolve over a number of decades.

The Sectoral Adaptation Plan for Flood Risk Management identifies a range of actions to assess and adapt to the potential impacts of climate change, including ongoing hydrometric monitoring and research to continue to improve our understanding of the impacts of climate change on flooding, and periodic reviews of the potential impacts of climate change on flood hazard and risk. These reviews and assessments will inform the need for future interventions in a timely manner as climate impacts evolve. It is therefore not considered necessary to designate as APSFRs, at this time, areas currently at low risk but that could be subject to increased risk under future scenarios.

Outcomes of the Review of the PFRA

The Review of the PFRA has determined that no additional APSFRs should be designated under this cycle of implementation of the 'Floods' Directive at this time.

Based on the analysis undertaken through the National CFRAM Programme, 101 of the 300 communities will be no longer designated as APSFRs for the purposes of the second cycle. However, it is important to stress that ongoing observation and review of the risk for these communities will be maintained, such as through future reviews of the PFRA and flood maps, and that these communities can still be considered for local flood relief works by the local authorities with funding provided by the OPW under the Minor Works Scheme.

199 communities are designated as APSFRs for the second cycle of implementation of the 'Floods' Directive

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1 INTRODUCTION

The National Preliminary Flood Risk Assessment (PFRA), that was a requirement of the EU 'Floods' Directive[1], was undertaken in 2011 and then completed in 2012 after public consultation. The PFRA was a national screening of flood risk in Ireland to inform the identification of communities at potentially significant flood risk. These communities were the focus of the National Catchment-based Flood Risk Assessment and Management (CFRAM) Programme.

This report outlines the Review of the PFRA has been undertaken as part of the second cycle of implementation of the Floods Directive.

1.1 BACKGROUND

The aim of the EU 'Floods' Directive, which came into force in 2007, is to reduce the adverse consequences of flooding on human health, the environment, cultural heritage and economic activity. The Directive requires Member States to undertake three key steps of analysis and planning:

- The PFRA: A screening of flood risk to identify Areas of Potentially Significant Flood Risk (APSFRs), which were referred to as Areas for Further Assessment (AFAs) for purposes of the National CFRAM Programme. The PFRA is a preliminary assessment, based on available or readily-derivable information.
- The Flood Maps: The preparation of flood hazard and risk maps for the APSFRs.
- The Flood Risk Management Plans (FRMPs): The preparation of plans setting out objectives and a set of measures aimed at the management and reduction of flood risk within the APSFRs.

In undertaking these three key steps, the Directive requires Member States to exchange information and coordinate across borders, to coordinate with the implementation of the Water Framework Directive (WFD) and to publish the PFRA and Maps and encourage the active involvement of interested parties in the preparation of the FRMPs.

The 'Floods' Directive is cyclical, requiring a review of the PFRA, the Flood Maps and the FRMPs on a six-yearly cycle.

The Floods Directive was transposed into Irish law by Statutory Instrument (SI) No. 122 of 2010, as amended by SI No. 495 of 2015.

1.2 THE PFRA

The PFRA was completed as part of the first cycle of implementation of the Floods Directive in 2011 through three key approaches:

- A Historic Analysis: The use of information on floods that have happened in the past.
- A Predictive Analysis: An assessment of areas that could be prone to flooding, as determined by predictive techniques such as modelling, analysis or other calculations, and of the potential impacts and damage that could be caused by such flooding.
- Consultation: The use of local and expert knowledge of the Local Authorities and other Government departments and agencies to identify areas prone to flooding and the potential consequences that could arise

[1] Directive on the assessment and management of flood risks, 2007/60/EC

In addition to the expert and public consultation, site inspections, referred to as 'Flood Risk Reviews' (FRRs), were undertaken by professional flood risk managers of each probable and possible AFA to review the findings of the PFRA and make recommendations as to whether the location should or should not be designated as an APSFR.

The PFRA covered a range of sources of flood risk, including fluvial (from rivers), tidal (from estuaries and the sea), groundwater (such as from turloughs) and pluvial (from intense rainfall events, particularly over urban areas). The PFRA also addressed flood risk that could arise from artificial water-bearing infrastructure, such as reservoirs and raised canals, that was assessed by the organisations with responsibility for that infrastructure (the local authorities, Electricity Supply board (ESB) and Waterways Ireland).

The PFRA considered a range of possible impacts of flooding, such as on people, property, infrastructure, cultural heritage and the environment. For the predictive assessment, the range of impacts were incorporated into a 'Flood Risk Index'.

The National PFRA Overview Report, which details the approaches taken and the findings of the PFRA, along with supporting technical reports and draft maps, was published in August 2011 for public consultation up to November 2011.

The submissions made in response to the public consultation were considered and a final PFRA Overview Report was published in March 2012 along with a report on the Designation of Areas for Further Assessment. This set out the 300 APSFRs (AFAs) that would be the focus of the National CFRAM Programme.

The reports on the PFRA as noted above are available from the OPW website at: https://www.floodinfo.ie/publications/?t=30 and https://www.floodinfo.ie/publications/?t=32.

1.3 THE NATIONAL 'CFRAM' PROGRAMME

In line with government policy set out through the Report of the Flood Policy Review Group (OPW, 2004), and to deliver on some of the key requirements of the EU 'Floods' Directive, the OPW developed and implemented the National Catchment-based Flood Risk Assessment and Management (CFRAM) Programme. The objectives of the Programme were to:

- Identify and map the existing and potential future flood hazard and risk within the AFAs,
- Identify viable structural and non-structural options and measures for the effective and sustainable management of flood risk in the AFAs and within the river basins as a whole,
- Prepare a set of FRMPs, and associated Strategic Environmental and Habitats Directive (Appropriate) Assessments, to set out the policies, strategies, measures and actions that should be pursued by the relevant bodies, including the OPW, Local Authorities and other Stakeholders, to achieve the most cost-effective and sustainable management of existing and potential future flood risk within the AFAs.

Pilot CFRAM Studies commenced in 2005-06 that were substantially complete in 2010. The National CFRAM Programme then began in 2011, in parallel with the final stages and completion of the PFRA.

Through the CFRAM Programme, and other parallel projects for certain areas, flood hazard and risk maps were prepared for the 300 AFAs, which were published for consultation in 2015, and 29 FRMPs were prepared. The draft FRMPs were published for public consultation in 2016, with the final FRMPs then approved by the Minister for Finance and Public Expenditure and Reform and published in May 2018.

The 300 AFAs are home to over 3 million people, approximately two-thirds of the national population, and 80% of properties potentially at risk in Ireland from rivers and seas that are the primary sources of flooding in Ireland. Ninety of these communities are in coastal areas. While the CFRAM Programme assessed flood risk in all our large urban areas, approximately half of communities assessed have populations of less than 2,000 people, while one quarter have populations of less than 500 people.

The FRMPs include measures that, in combination with the measures already completed or that were previously at construction or under design, will provide protection to 95% of the properties at risk within the 300 areas.

The flood maps, FRMPs and supporting technical reports are available from the OPW flood portal: https://www.floodinfo.ie/

The flood mapping was prepared for the current scenario, but also for two potential future scenarios (the Mid-Range and High-End Future Scenarios, or 'MRFS' and 'HEFS') taking into account long-term developments and the potential impacts of climate change. The assessment of the measures set out in the FRMPs took into account how adaptable a proposed measure might be to cope with the potential increases in flood hazard under these scenarios.

1.4 REVIEW OF THE PFRA

This report documents the Review of the PFRA under the second cycle of the 'Floods' Directive. The direction and scope of the Review was determined by the OPW in consultation with National 'Floods' Directive Coordination Group, with oversight provided through the Interdepartmental Flood Policy Coordination Group, taking into account:

- Historic Flood Risk Assessment: An analysis of floods that have happened since the completion of the PFRA (i.e., from 2012 to 2018)
- Predictive Flood Risk Assessment: The processes and outcomes of the PFRA and the National CFRAM Programme
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The Review includes an assessment of the APSFRs designated under the PFRA, and of the need for the designation of other APSFRs.

1.4.1 Sources of Flooding Considered

Flood hazard can arise from a range of sources of flooding. The definition of flooding in the 'Floods' Directive (Article 2[1]) is an open and wide-ranging definition, and as such the PFRA considers flood risk arising from any major source of flooding, including:

- Natural Sources:
    - Rivers (fluvial, including increased flow from snowmelt)
    - Sea (coastal and tidal)
    - Groundwater
    - Rainfall (pluvial)
- Artificial Water-Bearing Infrastructural Sources, including Urban Storm-water Drainage Systems, Reservoirs, Water Supply Systems, the ESB Infrastructure (hydropower dams and embankments) and Canals

The bodies that are responsible for the artificial-water bearing infrastructure, namely Irish Water, the local authorities, Waterways Ireland and the Electricity Supply Board, undertook reviews of the PFRA with respect to flood risk that could arise from the infrastructure for which they have responsibility.

Floods from sewerage systems (i.e., foul sewers) have been excluded from the scope of the PFRA on the basis that:

- They are typically localised and hence would generally cause limited damage.
- They would typically arise from blockage or other unpredictable incidents, and so it cannot be readily projected where they would be likely to occur, and hence where significant flood risk due to this source might exist.

Floods could also arise from sources other than those listed above. However, these would typically include floods for which the adverse consequences would never be deemed to be 'Significant', or which could not reasonably be predicted to occur, at any given location, based on the combination of their probability and degree of consequence. As such, these types of floods are excluded from the scope of the PFRA. Examples of such floods might include:

- Minor floods (e.g., overflowing appliances, burst plumbing, surcharging of septic tanks, local blockage of culverts, pipes or gullies, etc.)
- 'Freak' occurrences (e.g., over-turned water tanker, tsunami generated from a meteor strike, etc.)

1.4.2 Impacts of Flooding Considered

Article 1 of the 'Floods' Directive sets out that the purpose of the Directive is to establish a framework for the assessment and management of flood risks, aiming at the reduction of the adverse consequences associated with floods for four sectors; namely human health, the environment, cultural heritage and economic activity. For the PFRA, Articles 4(2)(b) and (d) emphasise that the assessment of adverse consequences of past and potential future floods should also focus on these four sectors.

The PFRA, the CFRAM and the assessments under this Review have taken the potential impacts for these four sectors into account where the relevant information is available or readily-derivable, as set out in the following Sections.

2 HISTORIC FLOOD RISK ASSESSMENT

The historic flood risk assessment involves an analysis of floods that have happened over recent years (2012 – 2018 inclusive), including their location and impacts.

2.1 THE PFRA

In the PFRA, that was undertaken during the first cycle of the implementation of the 'Floods' Directive, all available records of past floods were collated and evaluated, making use of the national past flood event database that is now published through the OPW flood portal; www.floodinfo.ie. The database now includes almost 15,000 flood event reports relating to almost 5,500 locations around the country.

The assessment of past floods in the first cycle included an evaluation of the number of past floods that had occurred in each community (flood hazard) and, where available, the impacts of the floods (flood risk), such as the number of properties flooded or the economic damage caused. The past flood hazard and risk then informed the identification of the previously designated APSFRs. The records of past floods available for the first cycle generally provided very limited information on impacts, prompting an improvement in approach to past flood event data collection.

A description of the assessment of past floods in the first cycle is provided in Section 3 of the National PFRA Overview Report, with tables of past flood information provided in Appendix C of that report (https://www.floodinfo.ie/publications/?t=30).

2.2 MAJOR FLOODING EPISODES: 2012 – 2018

A summary of some of the more significant flood events that occurred during the period of the Review is provided below in chronological order.

2.2.1 28th June 2012: County Cork

- **Source:** Intense rainfall event
- **Areas affected:** County Cork
- **Type of flooding:** Short duration (appx 12 hours)
- **No. of reported properties affected:** 608 properties (358 residential and 250 commercials, including 100 residential properties in Blackpool, 100 commercial properties in Douglas and 100 commercial and 70 residential properties in Clonakilty).

According to the Cork County Council - Report on Flooding Event of 28th June 2012, the worst affected catchments, Clonakilty, Douglas and Glanmire were short and steep in nature. This combined with the already saturated ground conditions and the intensity of the rainfall was a major contributory factor to the flooding. It was estimated that in excess of 50mm fell within 3 hours.

2.2.2 Winter Storms of 2013-14 (Mid-December 2013 to mid-February 2014) – Nationwide

- **Source:** A series of coastal storms
- **Areas affected:** 15 counties, mainly Coastal and some along the Shannon – Galway, Mayo, Clare, Cork, Kerry, Limerick, Dublin, Mayo, Louth, Wexford, Waterford, Wicklow, Tipperary, Westmeath and Roscommon

- **Type of flooding:** Mainly during high tides but also prolonged flooding along the Shannon.
- **No. of reported properties affected**: 1015 properties in total - 677 residential properties and 438 commercial properties including 191 residential properties in Limerick City alone.

National Directorate for Fire and Emergency Management produced a report called "Report On Severe Weather from 13 December 2013 to 17 February 2014". It states "During the period from 13 December 2013 to 6 January 2014 there were storms in or around Ireland roughly once every three days. In addition to the very strong winds there were periods of extremely heavy rain (most of them rather short-lived) and a lot of thunderstorm activity. These storms coincided with high tides and created severe conditions in a number of coastal areas."

2.2.3 12 - 14th November 2014

- **Source:** Predominantly pluvial event
- **Areas affected:** Counties Kildare, Meath, Wexford, Laois, Dublin, Tipperary, Waterford, Louth, Wexford, and Longford.
- **Type of flooding:** Short duration (appx. 12 hours)
- **No. of reported properties affected**: 95 properties in total - 69 residential properties and 26 commercial properties including 36 residential properties in Ashbourne, Co. Meath alone.

Heaving rainfall resulted in localised flash flooding across the east of the Country.

2.2.4 Winter of 2015-16 ('Storms Desmond, Eva and Frank') – Nationwide

- **Source:** Primarily fluvial – sustained rainfall and a series of Atlantic Storms.
- **Areas affected:** 26 counties (Offaly, Galway, Cavan, Louth, Roscommon, Westmeath, Sligo, Limerick, Clare, Laois, Waterford, Cork, Monaghan, Donegal, Kerry, Leitrim, Mayo, Wexford, Carlow, Kilkenny, Kildare and Louth).
- **Type of flooding:** Prolonged flooding over two months
- **No. of reported properties affected**: 856 properties in total - 469 residential properties and 387 commercial properties.

Tragically, there was one fatality due to flooding on the 5th of December at Annarow in Monaghan reported by Monaghan County Council. The report of the National Directorate for Fire and Emergency Management ("Report on Flooding December 4 2015 – January 13 2016") states that "The exceptional and in some areas record breaking rainfall that caused some of the worst flooding in Irelands history began in November 2015 and continued right up until early January 2016. This weather was punctuated by a series of Atlantic Storms including Storms Desmond, Eva and Frank. Rainfall totals over the period were 189% of normal, making it the wettest winter ever recorded.

The worst affected areas were the west, southwest and the areas along the Shannon and its tributaries and later the South East. Homes and businesses were flooded, transport links severely impacted and disruption was caused to everyday life for people in large swathes of the country. One of the most notable aspects of this severe weather emergency was its longevity, with flooding persisting in some areas into March 2016 and indeed longer the turlough regions of South Galway."

2.2.5 22nd August 2017 - Inishowen Peninsula, County Donegal.

- **Source:** Predominantly fluvial due excessive rainfall over a short duration of time
- **Areas affected:** Inishowen Peninsula, County Donegal.
- **Type of flooding:** Very short duration (flashy) but high volume
- **No. of reported properties affected**: 84 properties in total - 55 residential properties and 29 commercial properties including 29 residential properties in Burnfoot alone.

Flash flooding occurred in several areas across the Inishowen Peninsula when excessive rainfall over a short duration of time, combined with high tides in some areas, resulted in extremely high water levels in rivers causing them to overtop their banks and cause widespread damage. Sections of road carriageways collapsed in some areas.

2.2.6 22nd November 2017 - Mountmellick and County Laois

- **Source:** Fluvial due to excessive rainfall over a short duration
- **Areas affected:** Predominantly in County Laois however areas in Kerry, Dublin and Kildare were affected to a much lesser degree.
- **Type of flooding:** Very short duration (flashy) but high volume
- **No. of reported properties affected**: 131 properties in total - 107 residential properties and 24 commercial properties including 72 residential properties in Mountmellick alone.

The flooding in Mountmellick and Portarlington was described by Laois County Council as severe and unprecedented. Heavy rainfall over the Slieve Bloom Mountains caused rivers in the area to burst their banks resulting in flash flooding, up to depth of 1.22m in some places.

2.2.7 2nd January 2018 ('Storm Eleanor') - Galway City and West Coast

- **Source:** Coastal/Tidal
- **Areas affected:** Predominantly Galway City. Other areas of County Galway and Clare, Limerick, Cork and Mayo affected.
- **Type of flooding:** Very short duration during high tide and storm surge
- **No. of reported properties affected**: 248 properties in total - 193 residential properties and 155 commercial properties including 171 residential properties and 140 commercial properties in Galway City alone.

A report on the event states "the highest tidal level observed from the tidal stations in Galway City occurred on the evening of the 2nd of January 2018 during Storm Eleanor. This event caused significant flood damage to Galway City, the worst encountered in living memory with tidal flood waters over topping the Claddagh basin quay walls and the quays at the Docks area."

2.3 ASSESSMENT OF FLOODS: 2012 – 2018

The Review of the PFRA has considered the floods that have occurred since the completion of the PFRA, i.e., floods that occurred from 2012 to 2018 inclusive. The sources of information to identify and collate information on the past floods included:

– Data collated through the OPW flood data collection processes to maintain the national past flood event database

- Data collected through event-specific flood data collection exercises undertaken as part of the National CFRAM Programme
- Data provided in response to a specific data collection request issued to all of the local authorities to inform the Review of the PFRA
- Information derived from other sources, such as media reports

The flood event data collection process has been improved since the completion of the PFRA, with more detailed information on events now collated. For example, the number of properties affected during a flood is available for more than 90% of the events during which properties flooded that occurred from 2012 to 2018. A flood event data collection form[2] is now available online that seeks information on a range of impacts, including numbers of residential and commercial properties that were flooded, the infrastructure and heritage affected and information on any environmental impacts.

2.3.1 Impacts of Flooding Considered

Human Health and the Economy

The flooding of properties, both residential and commercial, will have impacts on people (e.g., risk of injury or fatality, ill health from contaminated water, stress, loss of belongings of personal value, etc.) and economic activity (damage to or destruction of commercial premises, machinery, stock, interruption of service due to access difficulties for customers and staff, etc.). At the level of the PFRA, and taking into account the improvement in flood event data collection and the availability of this data for almost all past floods, it is considered appropriate to use the number of properties flooded as an indicator for degree of impact for both of these sectors.

Cultural Heritage and the Environment

Information on the impact of past floods on cultural heritage and on water quality and the environment is sought through the flood event data collection form referred to above. However, it is rare that information on these impacts is reported, as either the impacts that occurred in a given flood are not considered significant or the impacts are unknown. In total, information on cultural heritage and on water quality / environmental impacts have been reported through this form for five and eleven flood events respectively.

2.3.2 Assessment of Information Available

In total, data on 870 flood events that occurred during the relevant period were collated. Of these events, 479 (55%) were events that occurred outside of communities designated as APSFRs in the first cycle and for which the flood risk was assessed in detail through the National CFRAM Programme.

Human Health and the Economy

Of the 870 recorded events, information was available for 504 events that properties were flooded, with a total of approximately 4,150 properties recorded as having flooded[3]. Only 634 of these properties (15% of the total) were flooded in areas outside of the communities previously designated as APSFRs (an average of less than 1.5 properties per event).

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2 https://www.floodinfo.ie/static/floodmaps/docs/past_floods/Past_Flood_Event_Technical_Form_V3.2.pdf

3 Note that some properties within this number may have been affected by more than one event, and hence may have been counted more than once.

Out of the 504 flood events for which there are records of properties having flooded, 210 are for areas outside of the communities previously designated as APSFRs, and in over 90% of these events five or less properties were flooded.

A table of the flood events during the period 2012 to 2018 where there are records available of properties having flooded is provided in Appendix A. Where the information available indicates that properties were flooded, but the number of properties is not provided, 'N/A' has been entered into the relevant column of the table.

The above indicates that the designation of the APSFRs in the first cycle and the coverage of assessment (the 300 'AFAs') of the National CFRAM Programme were inclusive and comprehensive in terms of the areas where there is a significant risk from flooding.

Cultural Heritage and the Environment

The impacts on cultural heritage that were reported were the flooding of listed buildings or local museums, and an incident of minor damage to an historic bridge. No reports were received of the destruction of heritage assets of national importance.

The water quality / environmental impacts reported are typically overflows from sceptic tanks, sewerage networks or waterworks, or spills from domestic oil tanks. No major environmental pollution incidents were reported.

2.4 ARTIFICIAL WATER-BEARING INFRASTRUCTURE

The review of the PFRA undertaken by the bodies that are responsible for artificial-water bearing infrastructure (Irish Water, the local authorities, Waterways Ireland and the Electricity Supply Board) included the identification and reporting on any past floods arising from such infrastructure. A number of pluvial floods (related to urban storm-water drainage systems) were reported. One pluvial flood event (related to urban storm-water drainage systems) was reported during which 50 properties were flooded in Ballyvolane, Cork City. However, this was caused by a blockage, and it is reported that remedial action has since been taken to reduce the likelihood of recurrence of such an event. No other significant floods arising from the relevant infrastructure was reported to have occurred.

2.5 REOCCURRING FLOODS

Article 4(2)(c) of the 'Floods' Directive requires an assessment of a description of the significant floods which have occurred in the past, where significant adverse consequences of similar future events might be envisaged. As the past floods that occurred under the Review of the PFRA are all relatively recent (2012-18), then the impacts of such floods, were they to occur again now, would be very similar as when the floods previously occurred. The assessment of the impacts and significance of past floods as set out in this Section is therefore considered to be applicable also to the reoccurrence of such events, and no separate assessment if necessary.

2.6 SIGNIFICANT FLOODS

Human Health and the Economy

Under the PFRA, a 'Historic Risk' Category of '4' was assigned to communities where past events had led to the flooding of 50 or more properties within that community, whereby a community with a 'Historic Risk' Category of '4' would have been designated as a 'Probable AFA'. The 'Probable AFAs' were the communities that were to be designated as APSFRs unless other information indicated that this should not be the case.

Applying this criteria to the floods that occurred from 2012 to 2018, it can be seen from the table in Appendix A that 16 such events occurred during this period; all of which were in communities previously designated as APSFRs in the first cycle.

Cultural Heritage and the Environment

As noted in Section 2.3 above, very few reports were received of impacts on cultural heritage and on water quality and the environment, and of those that were, only minor / local impacts were reported, i.e., no reports were received of floods causing impacts of national significance with regards to these sectors.

2.7 CONCLUSIONS

In relation to the past floods that occurred over the period 2012-18:

- Records are available for 870 flood events, with reports of flooding of 4,151 properties, of which only 634 are in areas outside of the communities previously designated as APSFRs (an average of less 1.5 properties per event).
- 16 significant flood events (50 or more properties recorded as having flooded) are reported to have occurred, all of which are within the areas previously designated as APSFRs.
- There is no specific information available indicating significant detrimental impacts to the environment or cultural heritage caused by floods over the relevant period.
- No significant floods are reported to have occurred from artificial-water bearing infrastructure that have not since been addressed in terms of the cause of the event.

The above conclusions will inform the assessment and designation of the APSFRs.

3 PREDICTIVE FLOOD RISK ASSESSMENT

The predictive flood risk assessment involves the estimation of risk based on calculations of flood extents and depths for floods that are predicted to occur with a given probability or frequency, and of the damages and impacts such floods would cause.

3.1 THE PFRA

As part of the PFRA, indicative, predictive flood maps were developed, or used where already available from other sources, to enable a predictive assessment of flood risk. These maps included:

- Fluvial flood maps, developed as part of the PFRA
- Coastal / tidal flood maps, as were available from the Irish Coastal Protection Strategy Study at the time[4]
- Groundwater (turlough) flood maps, developed as part of the PFRA
- Pluvial flood maps, developed as part of the PFRA

The maps developed for the PFRA were based on simple methodologies that were appropriate to the preliminary level of assessment of the PFRA, and as such were only indicative and were not necessarily locally accurate.

As the development of these maps was based on a hydrographic network, a DTM and hydraulic conveyance equations, the assessment took into account the topography, the position of watercourses and the conveyance capacity of floodplains.

The potential damages and impacts of possible future floods were then determined making use of the predictive flood maps and identifying what properties, features and infrastructural assets could be affected by such floods that included:

- homes, businesses and community properties such as libraries, garda stations and health facilities, (i.e., populated areas and areas of economic activity)
- transport infrastructure,
- energy water and telecommunications infrastructure,
- heritage and cultural properties and sites, and,
- protected sites of environment value.

Each of the properties, features and assets were assigned a ‘vulnerability’ classification to indicate the scale of impact in the event of a flood, which was combined with the probability of the property, feature or asset being flooded to calculate the ‘Flood Risk Index’ (FRI). The FRI was calculated for each property, feature or asset, and then also as a total FRI value for each community to represent the flood risk for that community, which in turn informed the decision as to whether or not an area should be designated as an APSFR.

The predictive risk assessment process followed during the PFRA is described in Section 4 of the National PFRA Overview Report (https://www.floodinfo.ie/publications/?t=30), with the vulnerability classifications and outcomes of the assessment provided in Appendices D and E of that report respectively.

4 https://www.opw.ie/en/flood-risk-management/floodanderosionmapping/icpss/

Further detail specifically on the vulnerability classifications for cultural heritage sites and properties and on the assessment methodology are available from the OPW website: https://www.floodinfo.ie/publications/?t=32

While the pluvial flood maps assisted with the determination of possible APSFRs in relation to flooding that could arise from urban storm-water drainage systems, predictive mapping was not available or readily-derivable with regards to other artificial water-bearing infrastructure, and so it was not possible to undertake predictive flood risk assessments in relation to these other types of infrastructure.

The conclusions of the PFRA predictive flood risk assessment informed the identification of the 300 APSFRs in the first cycle that became the focus of the National CFRAM Programme.

The CFRAM Programme has involved much more detailed hazard and risk assessments for the areas assessed and supersedes the predictive flood risk assessment from the PFRA. However, the PFRA predictive flood risk assessment, including the derivation of the Flood Risk Index scores for communities and areas across the country, remains the most comprehensive assessment available for areas not assessed under the CFRAM Programme, and hence forms a foundation for and informs this Review.

3.2 OUTCOMES OF THE NATIONAL CFRAM PROGRAME

The predictive assessment undertaken as part of the PFRA was preliminary and indicative as was appropriate for such a screening exercise. Under the National CFRAM Programme and parallel projects for some areas, detailed predictive flood maps were developed for the 300 previously designated APSFRs (AFAs) for a range of flood event magnitudes and probabilities making use of extensive field and aerial survey and detailed hydraulic modelling. The maps produced through the CFRAM Programme, and other parallel studies, cover the 300 communities that are home to over 3 million people, and also for reaches of river between these communities and then down to the open sea. The flood maps were prepared for potential future scenarios taking into account the potential impacts of climate change (see Section 5) as well as for the current scenario.

The detailed and extensive flood mapping produced under the CFRAM provides much more reliable information on flood extents and depths, relative to the assessment under the PFRA, which was then used to assess the flood risk in each of the previously designated APSFRs. The risk for each community assessed is reported in the FRMPs, including in tabular form in Appendix E of the FRMPs (https://www.floodinfo.ie/publications/?t=22).

The development of the flood maps was based on hydrological analysis, hydro-dynamic modelling making use of topographical and aerial survey (to produce DTMs), GIS information on assets and damage calculation methodologies. The process therefore took into account the topography, the position of watercourses and the conveyance and storage capacity of floodplains, flood defences, urban areas and property types. The future scenario mapping took account of climate change and development and land use change within the catchments.

The assessments under the National CFRAM Programme included assessments of the potential impacts of flooding and flood risk management measures to human health, cultural heritage, the environment and the economy, as documented in the FRMPs and through the Multi-Criteria Analysis[5] applied as part of the National CFRAM Programme.

[5] https://www.opw.ie/en/media/TMN%20for%20Option%20Appraisal%20and%20MCA%20-%20Rev%20B%20-%20Sept%202018.pdf

The detailed risk assessment provided for the economic justification of the 118 new flood protection measures proposed in the FRMPs which, in combination with existing flood relief schemes and those at various stages of design, planning and construction, will provide protection to approximately 95% of the properties at risk within the 300 previously designated APSFRs, and an estimated 80% of all of the properties at risk nationally from the main sources of flooding in Ireland, i.e., rivers and the sea. The measures proposed include schemes for cities, towns and villages, including some where there are relatively few properties at risk, but for which a viable measure was nonetheless identified.

The CFRAM detailed risk assessment identified a number of previously designated APSFRs where the risk was in fact relatively low and where a measure could not be justified, or very low where the appraisal of potential measures would not have been necessary or productive. These areas are where the risk was effectively over-estimated through the preliminary assessments of the PFRA and/or where a community was included on a precautionary basis when in fact the risk is not significant. This again indicates that the coverage of assessment of the National CFRAM Programme was inclusive and comprehensive.

3.3 OTHER PREDICTIVE RISK ASSESSMENTS

The predictive flood risk assessment undertaken as part of the PFRA provides national coverage remains the most comprehensive assessment available for areas not assessed under the CFRAM Programme. The detailed predictive risk assessment undertaken through the National CFRAM Programme focuses on the previously designated APSFRs that, as above, are home to approximately two-thirds of the population and covers an estimated 80% of the national risk from flooding from rivers and the sea.

It is considered that these two assessments provide sufficient contemporaneous information for the review of the PFRA. Further predictive risk assessments are therefore not necessary for this review.

It might be noted however that a revised set of national indicative fluvial maps are being produced, that the ICPSS national coastal mapping is being reviewed making use of recently recorded data, and that the Geological Survey of Ireland have produced more detailed maps for turlough flooding. This additional mapping can be used to improve the understanding of rural risk that will inform the review of the FRMPs in 2021.

3.4 CONCLUSIONS

The areas of potentially significant flood risk (APSFRs) identified through the predictive assessment as part of the PFRA were designated as Areas for Further Assessment (AFAs) for the purposes of the National CFRAM Programme. These areas were subject to more detailed predictive risk assessment under the CFRAM Programme. Where the risk was confirmed through the CFRAM Programme as significant, and for other communities where a relatively low number of properties were found to be at risk but nonethless for which a viable measure was identified, flood protection measures have been proposed in the FRMPs.

The analysis under the CFRAM Programme has however identified a number of communities where the risk was found to be low and/or where protection measures cannot be justified. While ongoing observation and review of the risk for these communities is required (e.g., in relation to potentially rising risk in the coming decades due to the potential impacts of climate change – see Section 5), it is not necessary to maintain these areas as APSFRs.

It is considered that the assessments under the PFRA and the CFRAM Programme provide sufficient contemporaneous information for the review of the PFRA. Further predictive risk assessments are therefore not necessary for this review.

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4 CONSULTATION

Consultation, particularly with knowledgeable stakeholders such as the local authorities, is an important mechanism for providing or validating information on flooding and flood risk from past floods and/or predictive assessments.

4.1 THE PFRA

Consultation with various bodies was undertaken during the preparation of the PFRA, which included two rounds of workshops (summer 2010 and winter 2010-2011) involving all local authorities. During these workshops, the local authorities provided information on areas known or suspected to be at risk from flooding, and reviewed the probable and possible APSFRs identified by the OPW through the predictive assessment and analysis of past floods.

Consultation was also held with a range of other key stakeholders, including Government Departments and state agencies, to inform the process and outcomes of the PFRA. Information was also exchanged with utility operators in relation to the location and potential vulnerability of utility infrastructure.

The OPW publicly consulted on a draft of the PFRA from 31st August to 1st November 2011 before it was finalised. Members of the public and all interested parties and stakeholders were encouraged to review the draft PFRA and provide further information on flooding and flood risk, and / or make and submit observations or submissions on the process followed and its outcomes. The submissions made during the public consultation, and other information arising, were taken into account to finalise the designation of the APSFRs.

Details of the outcome of the public consultation process are available from the Report on the Designation of Areas for Further Assessment (https://www.floodinfo.ie/publications/?t=31).

4.2 CONSULTATION UNDER THE NATIONAL CFRAM PROGRAMME

Extensive consultation, formal and informal, was undertaken as part of the implementation of the National CFRAM Programme.

4.2.1 Consultation and Engagement Structures

A governance structure was established of oversee and facilitate the implementation of the Programme, as set out below.

Interdepartmental Flood Policy Coordination Group

The initial role of the Interdepartmental Flood Policy Co-ordination Group, chaired by the OPW, was to coordinate and inform the progress in
implementing the recommendations of the Government's 2004 Report of the Flood Policy Review Group. In 2009, the Group also set the direction for the development of the CFRAM Programme. The Interdepartmental Flood Policy Coordination Group was reconvened by Government in July 2015.

The Group considers that the whole of Government approach is necessary to support flood risk management, so that Government Departments and State Agencies are each taking the lead to provide effective supports and policy measures for their areas of responsibility and to promote and address community and individual response.

The Group is chaired by the Minister of State with special responsibility for the Office of Public Works and Flood Relief and membership includes representatives from across Government and the local authorities, as set out in Appendix B.

National CFRAM Steering Group / National Floods Directive Coordination Group

The National CFRAM Steering Group was established in 2009. 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 'EU Floods Directive', including the CFRAM Programme. The CFRAM Steering Group reported, through the OPW, to the Interdepartmental Flood Policy Coordination Group.

At the end of 2018, following the launch of the Flood Risk Management Plans, the Group was dissolved and reformed as the National Floods Directive Coordination Group. The terms of reference for this Group were amended to support both the technical aspects for the delivery and review of the twenty-nine FRMPs and the six-year cyclical review of flood risk management required by the EU Floods Directive. The current membership of the Group is set out in Appendix B.

National CFRAM Stakeholder Group

The National CFRAM Stakeholder Group was established in 2014 to provide an opportunity for the engagement of a wide range of national, non-governmental stakeholder organisations at key stages in the process of the implementation of the National CFRAM Programme. Members of the organisations invited to meetings of this Group are listed in Appendix D.3 of the FRMPs (https://www.floodinfo.ie/publications/?t=22).

CFRAM Project Steering Groups

Project Steering Groups were established for each of the CFRAM Projects at the outset of the projects, and comprised senior representatives from the OPW, the local authorities and, as necessary the Environmental Protection Agency and the Department for Infrastructure, River of Northern Ireland. These Groups 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 membership of each of the Steering Group is set out in Appendix D.2 of the FRMPs.

CFRAM Project Progress Groups

Project Progress Groups were established for each of the CFRAM Projects following the first meetings of the Project Steering Groups. These groups, with representatives from the same organisations as for the Project Steering Groups, were working groups that supported the Project Steering Groups 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.

Project (Regional) CFRAM Stakeholder Groups

The CFRAM Stakeholder Groups were established at the outset of the projects to provide for the engagement of local non-governmental stakeholder organisations at key stages in the process of the implementation of the CFRAM Projects. The membership of each of the Steering Group is set out in Appendix D.4 of the FRMPs.

4.2.2 Public Consultation and Engagement

In addition to the structured engagement with relevant stakeholders through the Steering, Progress and Stakeholder Groups, the public were also given the opportunity and encouraged to engage with the implementation of the 'Floods' Directive and the CFRAM process.

Public Consultation Days

The OPW identified that effective consultation and public engagement would require local engagement at a community level, and hence determined that Public Consultation Days (PCDs) would be held in each of the previously designated APSRs (where possible and appropriate) to engage with the communities at various stages of the Projects, including during the production of the flood maps, the consideration of potentially viable measures and in relation to the Draft FRMPs.

The PCDs were advertised locally in advance, and were held at a local venue in the community during the afternoon and early evening. Staff from the project teams were present to explain the maps and potential measures that were displayed in the venue and answer any questions on the information provided and on the CFRAM process, and to collate local information to refine or confirm the maps and measures. Almost 500 PCDs were held nationally during the National CFRAM Programme.

Consultation on Flood Maps

The initial preparation of the flood maps involved extensive consultation with the Progress Groups and planners within the various relevant local authorities. This led to the development of draft flood maps that were then consulted upon with the public through local Public Consultation Days and a national, statutory consultation that was launched in November 2015. Observations and Objections submitted through the consultation process were assessed and the flood maps amended accordingly, where appropriate.

Consultation on Draft Flood Risk Management Plans

The Draft FRMPs were published for the purposes of public consultation in the second half of 2016, with presentations also made to the local authority Councils during the public consultation period. The observations submitted to the OPW through the public consultation processes were considered and the FRMPs amended accordingly where appropriate.

In consulting on the Draft FRMPs, some submissions received noted that areas outside of the previously designated APSFRs, and hence not covered by the CFRAM Programme, were at risk and should be assessed. The Review has included an assessment of the information provided with these submissions and of other new information available for these areas, such as from reported past floods in 2012-18 (noting that these areas would have been previously assessed as part of the PFRA and not designated as APSFRs). The Review found that most of these areas are rural with dispersed properties, with no evidence of significant risk. Of the 25 areas identified, past floods had been reported for only seven areas, each with very few or no properties identified as having flooded. It is concluded that the risk in these areas does not meet the criteria for designation as an APSFR (see Section 6.1).

4.2.3 Cross-Border Coordination

The OPW has an on-going relationship with the former Rivers Agency (now part of the Dept. for Infrastructure, Rivers), Northern Ireland (DfI Rivers), which is the Competent Authority for the implementation of the 'Floods' Directive in Northern Ireland.

In 2009, it was agreed between the two Authorities that a Cross-Border Coordination Group would be established to coordinate the implementation of the 'Floods' Directive across the border, and that this would be supported by a Cross-Border Technical Coordination Group. These groups first met in November 2009 and February 2010 respectively, and have met on a number of occasions since. The purpose of the Groups is to coordinate on the identification of APSFRs, to share information and agree approaches to the production of flood mapping in border areas and to coordinate on the identification of measures and the preparation of Plans.

DfI Rivers were represented throughout the CFRAM study on the relevant project steering, progress and stakeholders groups as well as on the National CFRAM Steering Group. DfI Rivers and the OPW have undertaken information exchange at all deliverable stages, including delivering joint presentations to stakeholders and also joint attendance at relevant consultation events.

4.2.4 Coordination with the Implementation of the Water Framework Directive

Both the Water Framework Directive (WFD) and the 'Floods' Directive are concerned with water and river basin management, and hence coordination is required between the two processes to promote integrated river basin management, achieve joint benefits where possible and address potential conflicts. There has been, and will continue to be, coordination with the authorities responsible for the implementation of the WFD through a range of mechanisms, including information exchange, bi-lateral meetings and cross-representation on various management groups.

4.3 CONSULTATION UNDER THE REVIEW OF THE PFRA

The approach, process and criteria applied in undertaking the Review of the PFRA were proposed, discussed and agreed by the National Floods Directive Coordination Group, and then approved by the Interdepartmental Flood Policy Coordination Group.

In undertaking the collation of information on past floods as part of the Review, the OPW requested all local authorities and the bodies that are responsible for artificial-water bearing infrastructure to provide any information they may have on past floods within their areas of responsibility, along with any information on predictive assessments that may have been undertaken. The local authorities and the bodies that are responsible for artificial-water bearing infrastructure were also invited to identify areas or communities at potentially significant flood risk. The information provided has informed the Review of the PFRA.

Some areas that are prone to flooding that were not previously designated as APSFRs have been identified by the local authorities. However, the degree of risk in these areas does not meet the criteria for the designation as an APSFR on the basis of impacts on human health and the economy, and no information was provided that significant risk to cultural heritage or the environment exists in these areas.

4.4 CONCLUSIONS

Extensive public consultation and engagement with relevant stakeholders has been undertaken from 2011 to date on flood risk and flood risk management in Ireland through formal coordination / steering groups, stakeholder groups, presentations to Councils, informal consultation and liaison, public consultation days and through national public consultations. These have included consultations on the PFRA (2011), on the flood maps (2015-16) and on the FRMPs (2016). The submissions made and outcomes of these consultations have been taken into account and informed the assessments and mapping of flood risk and the Review of the PFRA.

5 CONSIDERATION OF CLIMATE CHANGE

Article 14(4) of the 'Floods' directive requires that, in the second and subsequent cycles of implementation, the likely impact of climate change on the occurrence of floods shall be taken into account in the Review of the PFRA.

5.1 THE PFRA

Information on the potential impacts of climate change on flooding and flood risk was not available or readily-derivable at the time that the PFRA was undertaken, and hence was not taken into account.

5.2 THE IRISH COASTAL PROTECTION STRATEGY STUDY

The Irish Coastal Protection Strategy Study (ICPSS) was a national study commissioned in 2003 with the objective of providing information to support decision making about how best to manage risks associated with coastal flooding and coastal erosion. The Study was completed in 2013 and provides strategic current scenario and future scenario (up to 2100) coastal flood hazard maps and strategic coastal erosion maps for the national coastline. The ICPSS hazard mapping produced is available on the OPW website (https://www.opw.ie/en/flood-risk-management/floodanderosionmapping/icpss/).

The Irish Coastal Wave and Water Level Modelling Study (ICWWS) was commissioned in 2011 with the objective of providing information to facilitate the assessment of flood risk due to wave overtopping around the coast of Ireland. The Study was completed in 2013 and provides detailed nearshore water level and wave condition information for the current and future scenario (up to 2100) at 63 locations identified as being susceptible to wave overtopping and where this may contribute to significant coastal flooding both now and in the future.

5.3 THE NATIONAL 'CFRAM' PROGRAME

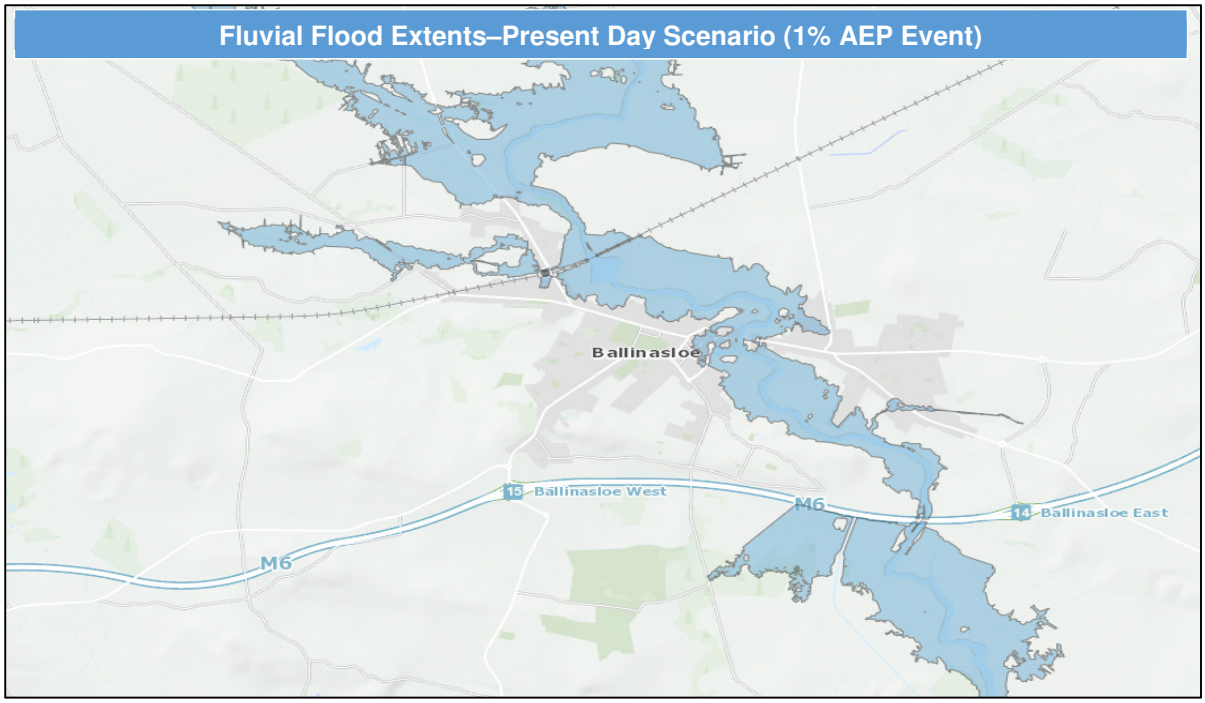
The CFRAM Programme assessed flood hazard and flood risk, including the production of flood maps, for two future scenarios (the 'Mid-Range' and 'High-End' Future Scenarios, or the 'MRFS' and 'HEFS'). These scenarios take into account long-term developments (e.g., increasing urbanisation) and the potential impacts of climate change, as well as for the current conditions for the 300 previously designated APSFRs, and for reaches in between these communities and down to the open sea. The Programme has hence generated a substantial quantity of data on the potential future increases in hazard and risk data nationally. The future scenario flood maps are available from the OPW flood portal: www.floodinfo.ie.

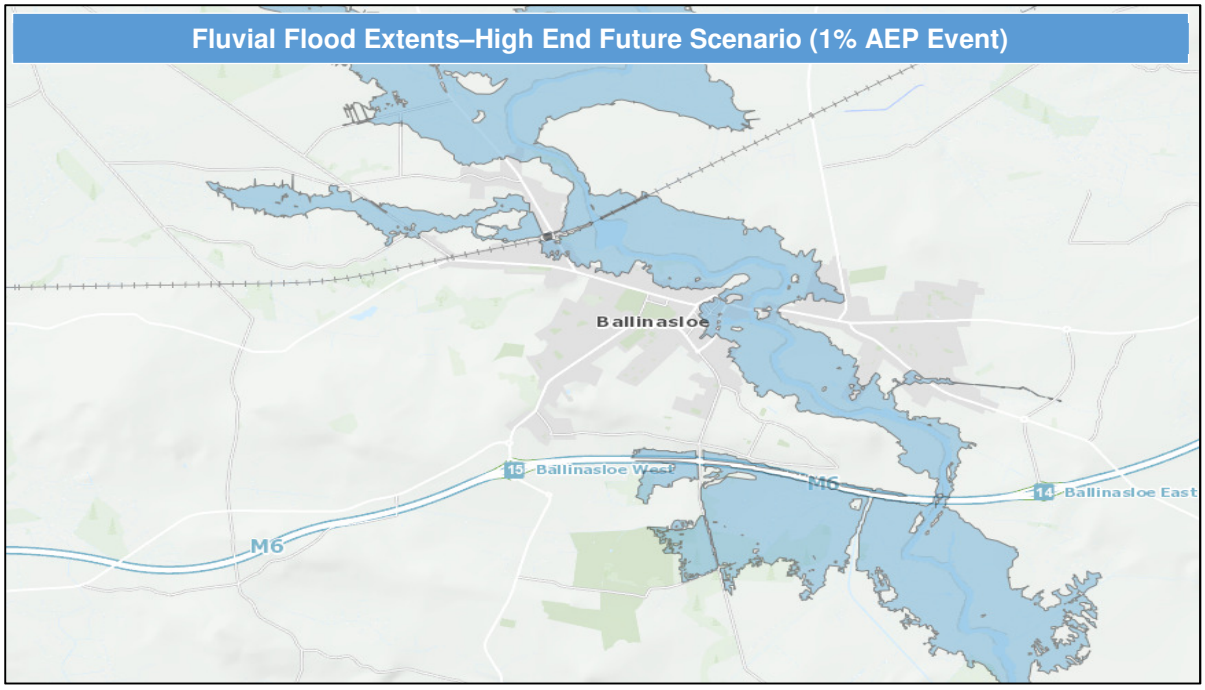
In order to carry out a risk assessment from these hazards it was necessary to identify the numbers and types of properties at risk for the scenarios, and the damages that would occur for specific events. This data is included in Appendix E of the Flood Risk Management Plans (FRMPs) (https://www.floodinfo.ie/publications/?t=22).

The potential increase in flood extents and the increases in impacts for properties and infrastructure are demonstrated in two case studies below examining the impact arising from fluvial flood risk and coastal flood risk.

Case Study 1: Fluvial Flood Risk – Climate Impact Assessment for Ballinasloe, Co. Galway

A climate impact assessment for fluvial flood risk has been carried out for Ballinasloe. This is based on the Shannon CFRAM Study using the Present Day Scenario in comparison to the MRFS and HEFS. The following two figures present flood extent maps showing the Present Day Scenario and High End Future Scenario for the 1% Annual Exceedance Probability (AEP) event (commonly known as 100-year event).
Both figures present flood extents for the 100-year event, and the second figure includes a 30% increase in peak flood flow under the climate change scenario.





The tables below provides details on the number and type of risk receptors, as well as the estimated event damage cost for the Present Day Scenario and High End Future Scenario.

This shows that there is an estimated 49 residential properties currently at risk from flooding during the 1% AEP event. Under climate change condition, which is estimated as a flow increase of 30% under the HEFS, the number of residential properties is predicted to increase to 65 in comparison to the current condition. The cost of flood damage at Ballinasloe is currently estimated at over €10 Million for the 1%AEP event and this is predicted to almost double under climate change condition.

Present Day Scenario			
Type of Risk	**10% AEP**	**1% AEP**	**0.1% AEP**
Event Damage (€)	425,527	10,244,554	22,417,232
No. Residential Properties at Risk	4	49	70
No. Business Properties at Risk	0	2	3
No. Utilities at Risk[1]	5	6	11
No. Major Transport Assets at Risk[2]	0	0	1
No. Highly Vulnerable Properties at Risk[3]	0	2	4
No. of Social Infrastructure Assets at Risk[4]	2	2	2
No. Environmental Assets at Risk[5]	0	0	0
No. Potential Pollution Sources at Risk[6]	7	63	152
High End Future Scenario			
Type of Risk	**10% AEP**	**1% AEP**	**0.1% AEP**
Event Damage (€)	7,257,824	19,262,669	54,312,176
No. Residential Properties at Risk	43	65	87
No. Business Properties at Risk	1	3	3
No. Utilities at Risk[1]	6	8	11
No. Major Transport Assets at Risk[2]	0	1	1
No. Highly Vulnerable Properties at Risk[3]	1	4	4
No. of Social Infrastructure Assets at Risk[4]	3	3	3
No. Environmental Assets at Risk[5]	0	0	0
No. Potential Pollution Sources at Risk[6]	53	127	277

Note 1,2,3,4,5 and 6 provide examples of Types of Risk under each category:

1) Power Stations, Water Treatment Plans, Waste Water Treatment Plans, Gas Assets and Telecommunication Exchanges
2) Motorway, National, Regional and Local Roads, Ports, Airports
3) Hospitals, Schools, Nursing / Residential Homes, Prisons, Camping / Caravan / Halting Sites
4) Schools, Libraries, Community Centres, Local and Central Government Offices (incl. Post Office), Emergency Services (Fire, Garda, Civil Defence, RNLI and Coast guard Stations), Health Centres, Churches, Parks and Public Gardens, Sports Facilities, Playgrounds, Local Cultural Heritage Sites.
5) Natura 2000 sites (SACs, SPAs), Ramsar Sites, Annex IV (Habitats Directive) species of flora and fauna, and their key habitats, Natural Heritage Areas, Nature Reserves, Wildfowl Sanctuary, OSPAR, National Parks
6) Plants licensed under Directives 96/61/EC and 91/271/EC, septic tanks greater than 500 PE, significant slurry storage facilities, establishments defined under Directive 2012/18/EU

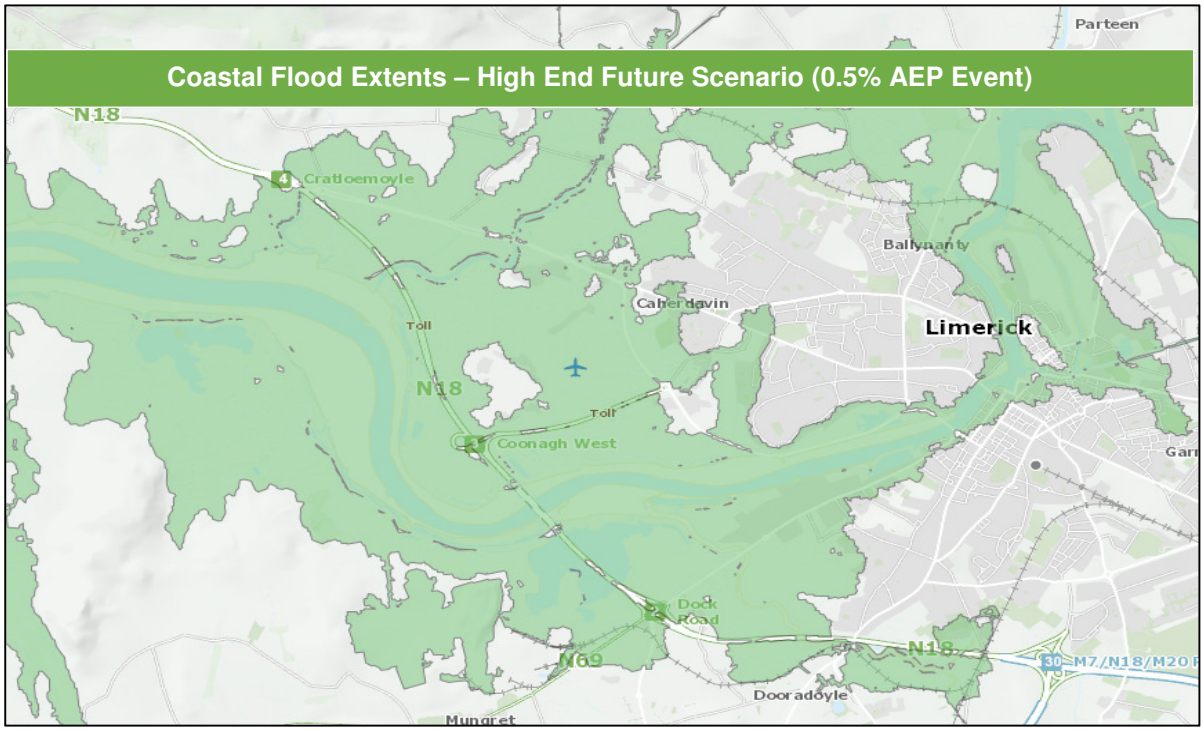
For further information on details and type of risk receptors, please refer to Appendix E of The Flood Risk Management Plan for Ballinasloe available at www.floodinfo.ie under Publications.

Case Study 2: Coastal Flood Risk – Climate Impact Assessment for Limerick City

A climate impact assessment for coastal flood risk has been carried out for Limerick City and Environs. This is based on the Shannon CFRAM Study using the Present Day Scenario in comparison to the MRFS and High End Future Scenario (HEFS). The following two figures present flood extent maps showing the Present Day Scenario and High End Future Scenario for the 0.5% Annual Exceedance Probability (AEP) event (also commonly known as 200-year event). Both figures present flood extents for the 200-year event, and the second figure includes 1m of sea level rise under the climate change scenario.

Coastal Flood Extents – Present Day Scenario (0.5% AEP Event)

Coastal Flood Extents – High End Future Scenario (0.5% AEP Event)



The tables below present details on the number and type of risk receptors, as well as the estimated event damage cost for the Present Day Scenario and High End Future Scenario.

This shows that there is an estimated 1,122 residential properties and 248 business properties currently at risk from flooding during the 0.5% AEP event. Under climate change condition, which is estimated as sea level rise by 1m under the HEFS, the number of residential and business properties at risk is predicted to increase by more than double in comparison to the current condition. The cost of flood damage at Limerick City and Environs is currently estimated at over €83 Million for the 0.5%AEP event and this is predicted to rise to over €1 Billion under climate change condition. This corresponds to an increase of 12.5 times in comparison to the current condition.

Present Day Scenario			
Type of Risk	**10% AEP**	**0.5% AEP**	**0.1% AEP**
Event Damage (€)	3,776,223	83,149,253	497,504,513
No. Residential Properties at Risk	89	1,122	1,856
No. Business Properties at Risk	6	248	485
No. Utilities at Risk[1]	0	0	2
No. Major Transport Assets at Risk[2]	27	49	85
No. Highly Vulnerable Properties at Risk[3]	0	4	6
No. of Social Infrastructure Assets at Risk[4]	2	6	14
No. Environmental Assets at Risk[5]	4	4	6
No. Potential Pollution Sources at Risk[6]	0	0	0

High End Future Scenario			
Type of Risk	**10% AEP**	**0.5% AEP**	**0.1% AEP**
Event Damage (€)	358,259,000	1,035,710,958	1,752,867,802
No. Residential Properties at Risk	1,757	2,636	5,047
No. Business Properties at Risk	239	510	766
No. Utilities at Risk[1]	0	2	2
No. Major Transport Assets at Risk[2]	40	69	85
No. Highly Vulnerable Properties at Risk[3]	1	6	6
No. of Social Infrastructure Assets at Risk[4]	3	12	14
No. Environmental Assets at Risk[5]	5	6	6
No. Potential Pollution Sources at Risk[6]	1	1	4

Note 1,2,3,4,5 and 6 provide examples of Types of Risk under each category:

7) Power Stations, Water Treatment Plans, Waste Water Treatment Plans, Gas Assets and Telecommunication Exchanges
8) Motorway, National, Regional and Local Roads, Ports, Airports
9) Hospitals, Schools, Nursing / Residential Homes, Prisons, Camping / Caravan / Halting Sites
10) Schools, Libraries, Community Centres, Local and Central Government Offices (incl. Post Office), Emergency Services (Fire, Garda, Civil Defence, RNLI and Coast guard Stations), Health Centres, Churches, Parks and Public Gardens, Sports Facilities, Playgrounds, Local Cultural Heritage Sites.
11) Natura 2000 sites (SACs, SPAs), Ramsar Sites, Annex IV (Habitats Directive) species of flora and fauna, and their key habitats, Natural Heritage Areas, Nature Reserves, Wildfowl Sanctuary, OSPAR, National Parks
12) Plants licensed under Directives 96/61/EC and 91/271/EC, septic tanks greater than 500 PE, significant slurry storage facilities, establishments defined under Directive 2012/18/EU

For further information on details and type of risk receptors, please refer to Appendix E of the Flood Risk Management Plan for Limerick City & Environs available at www.floodinfo.ie under Publications.

An analysis of this data has been carried out for the communities assessed under the CFRAM Programme to determine the potential impact the MRFS and HEFS would have relative to the Current Scenario. It is clear from this assessment that, without the ongoing and future investment in flood protection works, the impact of the MRFS and HEFS on flooding and flood risk in terms of increased damage for a given event frequency would be very significant.

Some observations can be drawn from inspection of the analysis, as follows:

- For flood events that would occur relatively frequently (those with a 10%, or 1 in 10, chance of occurring or being exceeded in any given year), the number of properties that would potentially become at risk increase very significantly in percentage terms, with a commensurate rise in potential damages. It should be noted however that:
    - The number of properties currently at risk from these relatively frequent events is quite low, and so the increase in the absolute number of additional properties that would be at risk is less than for more severe / less frequent events, and,
    - the majority of these properties are to be protected against such events by flood relief schemes that are currently in construction or under design, or that are planned as set out in the FRMPs.
- For rare flood events (those with a 1%, or 1 in a 100, chance in any given year), the number of properties and risk increase significantly, but less so than the more frequent floods. For example, the number of properties that could become at risk in the MRFS approximately doubles for fluvial (river) flooding and approximately quadruples for coastal flooding. However, climate change is taken into account in the design and implementation of the flood relief schemes currently in construction or under design, or that are planned as set out in the FRMPs, and so many of these additional properties will also be protected.
- For both scenarios and across the range of frequency, or severity, of flood event, the potential impacts of future increases in coastal flooding are greater than for fluvial flooding.
- The assessments under the CFRAM Programme have identified that impact of climate change on both hazard and risk is site specific and varies significantly from community to community, with no clear national geographical trends.

5.4 CONSIDERATION UNDER THE REVIEW OF THE PFRA

Through the ICPSS and the National CFRAM Programme, it has been determined that the potential impacts of climate change can increase significantly flood risk in Ireland , particularly in coastal areas. In addition to the flood relief schemes proposed under the FRMPs, the need for further, additional flood risk management measures may arise over the coming decades for other communities, where the current level of risk is low, due to the projected increases in flood risk. It should be noted however that the degree of change assessed (the MRFS and HEFS), if realised, will occur over a number of decades, rather than in the immediate future (i.e. within this cycle of implementation of the Directive).

The Draft Climate Change Sectoral Adaptation Plan for Flood Risk Management was published by the OPW for consultation in July 2019, with a view to the submission of a final Plan to government in September 2019. The Plan, once finalized, will be published on the OPW website (https://www.opw.ie/en/flood-risk-management/). The Plan includes a set of adaptation objectives and a series of actions aimed towards achievement of the objectives.

Objective No. 1 in the Plan is '*Enhancing our knowledge and understanding of the potential impacts of climate change for flooding and flood risk management through research and assessment*'. Actions under this objectives include:

- ongoing hydrometric monitoring and research to continue to improve our understanding of the impacts of climate change on flooding, and,
- periodic reviews and assessments of the potential impacts of climate change on flood hazard and risk, including ongoing programmes to develop national indicative fluvial mapping for current and future scenarios and to review the findings of the ICPSS.

These reviews and assessments, informed by the ongoing monitoring and research, will inform adaptation actions that may be required in the coming years for flood relief schemes previously completed. They will also inform in a timely manner any adaptation actions necessary for other areas or communities, such as those currently at low risk but that may become susceptible to significant risk in the future, and will indicate the 'trigger points' to commence consideration of such future interventions.

Taking into account the timelines for the realisation of the impacts of climate change, and the ongoing monitoring, research and reviews of potential impacts, it is considered that the need for future interventions can be identified in a timely manner. As such, it is not necessary to designate as APSFRs, at this time, areas currently at low risk but that could be subject to significant risk under the future scenarios.

5.5 CONCLUSIONS

The potential impacts of climate change were not taken into account in the PFRA in 2011, but have been assessed through the ICPSS and in detail for the previously designated 300 APSFRs through the National CFRAM Programme. It has been determined that the potential impacts of climate change can increase flood risk in Ireland very significantly in the future, particularly in coastal areas. These impacts will however evolve over a number of decades.

The Sectoral Adaptation Plan for Flood Risk Management identifies a range of actions to assess and adapt to the potential impacts of climate change, including ongoing hydrometric monitoring and research to continue to improve our understanding of the impacts of climate change on flooding, and periodic reviews of the potential impacts of climate change on flood hazard and risk. These reviews and assessments will inform the need for future interventions in a timely manner as climate impacts evolve. It is therefore not considered necessary to designate as APSFRs, at this time, areas currently at low risk but that could be subject to significant risk under future scenarios.

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6 OUTCOMES OF THE REVIEW OF THE PFRA

The review of the PFRA has made use of a number of approaches and data sources, including:

- Historic Flood Risk Assessment: An analysis of floods that have happened since the completion of the PFRA (i.e., from 2012 to 2018)
- Predictive Flood Risk Assessment: The processes and outcomes of the PFRA and the National CFRAM Programme
- Consultation: A review of the outcomes of consultation undertaken
- Climate Change: Consideration of the potential impacts of climate change

The outcomes of each of these approaches have informed the conclusions of the Review of the PFRA and the identification of the APSFRs.

6.1 CRITERIA FOR THE DEFINITION OF AREAS OF POTENTIALLY SIGNIFICANT FLOOD RISK (APSFRs)

The criteria for the definition of the APSFRs are set according to the approach used, as above, and the sector being considered.

6.1.1 Past Floods

Cultural Heritage and the Environment

As noted in Section 2.3, very few reports were received of impacts on cultural heritage and on water quality and the environment, and of those that were, only minor / local impacts were reported, i.e., no reports were received of floods causing impacts of national significance with regards to these sectors.

No additional APSFRs are proposed on the basis of the impacts of past floods with regards to cultural heritage and the environment.

Human Health and the Economy

Based on the criteria of a significant past flood event being those with a 'Historic Risk' Category of '4' (flooding of 50 or more properties within that community), 16 significant past flood events occurred during the period to 2012 to 2018 (see Appendix A) that occurred in 13 locations. All 13 of these locations were previously designated as APFRSs in the first cycle.

No additional APSFRs are proposed on the basis of the impacts of past floods with regards to human health and the economy.

6.1.2 Predictive Flood Risk Assessment

The PFRA Predictive Flood Risk Assessment

As set out in section 3.2 herein, the PFRA predictive flood risk assessment, including the derivation of the Flood Risk Index scores for communities and areas across the country, remains the most comprehensive assessment available for areas not assessed under the CFRAM Programme. The conclusions of that assessment informed the identification of the 300 APSFRs in the first cycle and the Review of the PFRA.

The PFRA predictive assessment included the consideration of impacts on human health, cultural heritage, the environment and the economy, as set out in 3.1 herein, and in the reports referred to in Section 3.1.

While the potential impacts of floods on protected areas were assessed as part of the PFRA predictive assessment (Section 4.4.4 of the National PFRA Overview Report), APSFRs were not designated on this basis for the reasons given in Section 6.2.1 of the Overview Report (https://www.floodinfo.ie/publications/?t=30). Further, the necessary information on the dispersion and impact of pollutants that may be released in the vent of a flood is not available or readily-derivable. As such, no specific indicator has been used for the designation of APSFRs with regards to the predictive assessment of environmental impacts.

The National CFRAM Programme

The predictive assessment undertaken as part of the PFRA was preliminary and indicative as was appropriate for such a screening exercise. Under the National CFRAM Programme, detailed predictive flood maps were developed for the 300 previously designated APSFRs for a range of flood event magnitudes and probabilities making use of extensive field and aerial survey and detailed hydraulic modelling.

The assessments under the National CFRAM Programme included assessments of the potential impacts of flooding and flood risk management measures to human health, cultural heritage, the environment and the economy, as documented in the FRMPs, and through the Multi-Criteria Analysis applied as part of the National CFRAM Programme.

The CFRAM detailed risk assessment identified a number of the previously designated APSFRs where the risk was in fact relatively low and where a measure could not be justified, or very low where the appraisal of potential measures would not have been necessary or productive. These areas are where the risk was effectively over-estimated through the preliminary assessments of the PFRA and/or where a community was included on a precautionary basis when in fact the risk is not significant.

In line with the criteria applied for the PFRA, whereby communities that already benefit from major flood relief schemes built by the OPW or the local authorities were designated as APSFRs, communities where future flood relief schemes are proposed in the FRMPs will be maintained as APSFRs.

6.1.3 Consultation

Extensive consultation with local authorities, other state agencies and Government Departments and with the public, was undertaken for the PFRA in 2010-11, and throughout the National CFRAM Programme, as set out in Section 4. Consultees included representatives from a range of organisations including those with an interest in or representing the sectors of human health, cultural heritage, the environment and the economy, as well as with the Rivers Agency (now Dept. for Infrastructure, Rivers, in Northern Ireland) and the authorities with responsibility for the implementation of the water Framework Directive.

Submissions made during the national public consultation processes on the flood maps and the draft FRMPs informed the assessment of the areas prone to potentially significant flood risk, and included the identification of areas of risk not previously designated as APSFRs, which have been considered as part of the Review of the PFRA.

Further consultation with the local authorities and the Interdepartmental Flood Policy Coordination Group and the National Floods Directive Coordination Group has been undertaken as part of the Review of the PFRA. Some areas that are prone to flooding that were not previously designated as APSFRs have been identified by the local authorities. However, the degree of risk in these areas does not meet the criteria for the designation as an APSFR.

6.1.4 Artificial-Water Bearing Infrastructure

The bodies that are responsible for artificial-water bearing infrastructure undertook reviews of the PFRA with respect to flood risk that could arise from the infrastructure for which they have responsibility.

No additional APSFRs have been identified with regards to this potential source of flooding.

6.1.5 Climate Change

As set out in Section 5, it has been determined that the potential impacts of climate change can increase flood risk in Ireland very significantly in the future, particularly in coastal areas. These impacts will however evolve over a number of decades. Ongoing reviews and assessments, as set out in the Sectoral Adaptation Plan for Flood risk Management, will inform the need for future interventions in a timely manner as climate impacts evolve. It is therefore not considered necessary to designate as APSFRs, at this time, areas currently at low risk but that could be subject to significant risk under future scenarios.

6.2 DETERMINATIONS OF THE REVIEW OF THE PFRA

The Review of the PFRA has determined that no additional APSFRs should be designated under this cycle of implementation of the 'Floods' Directive.

Based on the analysis undertaken through the National CFRAM Programme, 101 communities that had previously been designated as APSFRs will be no longer designated as APSFRs for the purposes of formal EU reporting in the second cycle of implementation of the 'Floods' Directive. However, it is important to stress that ongoing observation and review of the risk for these communities will be maintained (e.g., in relation to potentially rising risk in the coming decades due to the potential impacts of climate change – see Section 5), such as through future reviews of the PFRA and flood maps, and re-assessment based on the outcomes of the national indicative flood mapping that is ongoing (see Section 3.3). These communities can still be considered for local flood relief works by the local authorities with funding provided by the OPW under the Minor Works Scheme.

199 communities are designated as APSFRs for the second cycle of implementation of the 'Floods' Directive, as listed in Appendix C.

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APPENDIX A

Records of Number of Properties Flooded During Past Floods

County	Location	Start Date	AFA	AFA No.	Source of Flooding	No. of Properties Flooded
Carlow	Graiguenamanagh	2015	Y	140162	Fluvial	11
Carlow	Carlow	27/12/2015	Y	140155	Fluvial	6
Carlow	Carlow	Unknown	Y	140155	Fluvial	5
Carlow	St Mullins	2015	N	-	Fluvial	5
Carlow	Carlow	Unknown	Y	140155	Fluvial	2
Carlow	Bagnelstown	27/12/2015	N		Fluvial	1
Carlow	Ballinree	Recurring	N	-	Fluvial	1
Carlow	Carlow	Unknown	Y	140155	Fluvial	1
Carlow	Clonegall	27/12/2015	N		Fluvial	1
Carlow	Knockloe	Recurring	N	-	Fluvial	1
Carlow	New Acre	2015	N	-	Fluvial	1
Carlow	Ricketstown	Unknown	N	-	Fluvial	1
Carlow	Fonthill	2015	N	-	Pluvial	1
Carlow	Tinryland	Unknown	N	-	Pluvial	1
Carlow	Tullow	2015	Y	120141	Pluvial	1
Carlow	Carlow	Unknown	Y	140155	Fluvial	N/A
Cavan	Drummullan	01/12/2015	N	-	Fluvial	5
Cavan	Crossdoney	14/12/2015	N		Pluvial	1
Cavan	Bawnboy	01/12/2015	N	-	Fluvial	3
Cavan	Legaland, Crossdoney	01/12/2015	N	-	Fluvial	3
Cavan	Coppanagh	Recurring	N	-	Fluvial	1
Cavan	Dowra	01/12/2015	N	-	Fluvial	1
Cavan	Tullavally	01/01/2013	N	-	Fluvial	1
Cavan	Tullavally	01/11/2014	N	-	Fluvial	1
Cavan	Cavan	28/12/2015	Y	360572	Fluvial	N/A
Clare	Miltown Malbay	11/09/2015	N	-	Fluvial	25
Clare	Springfield	01/12/2015	Y	259015	Fluvial	6
Clare	Creegh	11/09/2015	N	-	Fluvial	2
Clare	Caherfennick	20/08/2017	N		Pluvial	2
Clare	Liscannor	11/09/2015	N	-	Fluvial	1
Clare	Ennis	05/12/2015	Y	270474	Fluvial	N/A
Clare	Feakle	05/12/2015	N		Fluvial	N/A
Clare	Killaloe/Ballina	01/12/2015	Y	250427	Fluvial	N/A
Clare	O'Brien's Bridge	01/12/2015	Y	250434	Fluvial	N/A
Cork	Cork City	03/02/2014	Y	190286	Coastal / Tidal	239
Cork	Clonakilty	27/06/2012	Y	200294	Fluvial	170
Cork	Douglas	28/06/2012	Y		Fluvial	130

Cork	Blackpool	28/06/2012	Y	190286	Fluvial	111
Cork	Clonakilty	03/02/2014	Y	200294	Coastal / Tidal	71
Cork	Glanmire	28/06/2012	Y	190290	Fluvial	53
Cork	Bandon	04/12/2015	Y	200293	Fluvial	50
Cork	Ballyvolane	28/06/2012	Y	190286	Pluvial	50
Cork	Cork City	28/06/2012	Y	190286	Fluvial	42
Cork	Youghal	03/02/2014	Y	180267	Coastal / Tidal	39
Cork	Bandon	28/06/2012	Y	200293	Fluvial	21
Cork	Schull	15/08/2012	Y	200303	Pluvial	21
Cork	Macroom	24/08/2012	Y	190270	Pluvial	20
Cork	Cork City	Recurring	Y	190286	Pluvial / Tidal	20
Cork	Ballinascarthy	12/07/2012	N		Fluvial	17
Cork	Crookstown	27/06/2012	N		Fluvial	16
Cork	Ballinaspittle	25/01/2013	N	-	Fluvial	15
Cork	Cork City	17/10/2012	Y	190286	Coastal / Tidal	13
Cork	Cork City	02/01/2014	Y	190286	Coastal / Tidal	12
Cork	Midleton	03/02/2014	Y	190279	Coastal / Tidal	12
Cork	Kinsale	04/02/2014	N		Coastal / Tidal	11
Cork	Killumney	29/12/2015	N		Fluvial	11
Cork	Clonakilty	28/08/2012	Y	200294	Pluvial	11
Cork	Midleton	29/12/2015	Y	190279	Fluvial	10
Cork	Bantry	24/10/2013	Y	210307	Pluvial	10
Cork	Bantry	17/10/2012	Y	210307	Pluvial / Tidal	10
Cork	Youghal	17/10/2012	Y	180267	Pluvial / Tidal	10
Cork	Bantry	02/01/2014	Y	210307	Coastal / Tidal	9
Cork	Clonakilty	03/12/2015	Y	200294	Fluvial	9
Cork	Midleton	05/06/2012	Y	190279	Pluvial	9
Cork	Glanmire	29/12/2015	Y	190290	Fluvial	8
Cork	Macroom	29/12/2015	Y	190270	Fluvial	8
Cork	Ballinacurra	25/07/2013	Y	190279	Pluvial	8
Cork	Curraheen	27/06/2012	N		Fluvial	7
Cork	Rosscarbery	04/02/2014	N		Coastal / Tidal	6
Cork	Ballingeary	04/12/2015	Y	195499	Fluvial	6
Cork	Ballinascarthy	28/06/2012	N		Pluvial	6
Cork	Ballingeary	11/09/2015	Y	195499	Fluvial	5
Cork	Curraheen	13/07/2012	N	-	Fluvial	5
Cork	Fermoy	29/12/2015	Y	180252	Pluvial / Fluvial	5
Cork	Ballinascarthy	04/12/2015	N		Fluvial	4
Cork	Castlemartyr	19/10/2017	Y	190277	Fluvial	4
Cork	Bandon	19/09/2014	Y	200293	Pluvial	4
Cork	Leap	25/01/2013	N		Pluvial	4
Cork	Leap	24/10/2013	N		Pluvial	4
Cork	Skibereen	05/12/2015	Y	200302	Pluvial / Fluvial	4
Cork	Ballingeary	29/12/2015	Y	195499	Fluvial	3
Cork	Ballyvorney	29/12/2015	Y	190292	Fluvial	3

Cork	Bantry	05/12/2015	Y	210307	Fluvial	3
Cork	Inchigeelagh	04/12/2015	Y	190268	Fluvial	3
Cork	Skibereen	30/12/2015	Y	200302	Fluvial	3
Cork	Inchigeelagh	29/12/2015	Y	190268	Pluvial / Fluvial	3
Cork	Ballinacurra	03/02/2014	Y	190279	Coastal / Tidal	2
Cork	Clonakilty	06/01/2014	Y	200294	Coastal / Tidal	2
Cork	Cobh	03/02/2014	N		Coastal / Tidal	2
Cork	Ballynascarthy	17/01/2013	N	-	Fluvial	2
Cork	Carrigtohil	03/12/2015	N	-	Fluvial	2
Cork	Connonagh	03/01/2013	N	-	Fluvial	2
Cork	Connonagh	25/01/2013	N		Fluvial	2
Cork	Killumney	04/12/2015	N		Fluvial	2
Cork	Manch	20/11/2012	N	-	Fluvial	2
Cork	Rathcormac	24/08/2012	N	-	Fluvial	2
Cork	Clonakilty	11/10/2012	Y	200294	Pluvial	2
Cork	Conna	30/12/2013	N		Pluvial	2
Cork	Cork City	27/06/2012	Y	190286	Pluvial	2
Cork	Cork City	16/04/2018	Y	190286	Pluvial	2
Cork	Lissarda	04/12/2015	N		Pluvial	2
Cork	Midleton	24/07/2013	Y	190279	Pluvial	2
Cork	Dunmanway	03/12/2015	Y	200297	Pluvial / Fluvial	2
Cork	Manch	03/12/2015	N		Pluvial / Fluvial	2
Cork	Carrigaline	17/10/2012	Y	190289	Coastal / Tidal	1
Cork	Carrigaline	14/12/2012	Y	190289	Coastal / Tidal	1
Cork	Carrigaline	06/01/2014	Y	190289	Coastal / Tidal	1
Cork	Castlelyons	29/12/2015	N		Fluvial	1
Cork	Garryvoe	19/10/2017	N		Fluvial	1
Cork	Grillagh	25/01/2013	N		Fluvial	1
Cork	Kilcrea Bridge	28/12/2015	N		Fluvial	1
Cork	Killavullen	29/12/2015	N		Fluvial	1
Cork	Riverstick	29/12/2015	N		Fluvial	1
Cork	Rosscarbery	25/01/2013	N		Fluvial	1
Cork	Toon Bridge	29/12/2015	N		Fluvial	1
Cork	Ballinhassig	25/01/2013	N	-	Pluvial	1
Cork	Douglas	26/08/2015	Y	190291	Pluvial	1
Cork	Rathcormac	29/12/2015	Y	180265	Pluvial	1
Cork	Ballinaspittle	24/12/2015	N		Pluvial / Fluvial	1
Cork	Skibereen	25/10/2013	Y	200302	Coastal / Tidal	N/A
Cork	Bandon	30/12/2015	Y	200293	Fluvial	N/A
Cork	Mallow	28/06/2012	Y	190270	Fluvial	N/A
Cork	Rathbarry	28/06/2012	N		Fluvial	N/A
Cork	Clonakilty	25/01/2013	Y	200294	Pluvial	N/A
Cork	Kinsale	24/12/2015	N		Pluvial	N/A
Cork	Rathbarry	28/08/2012	N	-	Pluvial	N/A
Cork	Mallow	30/12/2015	Y	190270	Pluvial / Fluvial	N/A

Donegal	Burnfoot	22/08/2017	Y	390601	Fluvial	37
Donegal	Castlefinn	05/12/2015	Y	10003	Fluvial	25
Donegal	Ballybofey / Stranorlar	05/12/2015	Y	10002	Pluvial / Fluvial	17
Donegal	Carndonagh	22/08/2017	Y	400616	Fluvial	12
Donegal	Raphoe	22/08/2017	Y	10648	Pluvial	12
Donegal	Buncrana	22/08/2017	Y	390600	Fluvial	11
Donegal	Donegal	15/11/2015	Y	370580	Fluvial	11
Donegal	Rathmelton	05/08/2014	Y	390611	Fluvial	10
Donegal	Lifford	05/12/2015	Y	10008	Pluvial / Fluvial	10
Donegal	Killybegs	04/10/2017	Y	370585	Coastal / Tidal	9
Donegal	Burnfoot	14/11/2015	Y	390601	Fluvial	9
Donegal	Donegal	Recurring	Y	370580	Fluvial	8
Donegal	Kerrykeel	10/06/2014	Y	380594	Fluvial	7
Donegal	Rathmullan	Recurring	Y	390613	Fluvial	7
Donegal	Ballybofey / Stranorlar	Recurring	Y	10002	Fluvial	6
Donegal	Burnfoot	18/05/2013	Y	390601	Fluvial	6
Donegal	Castlefinn	Recurring	Y	10003	Fluvial	6
Donegal	Doochary	Recurring	N	-	Fluvial	6
Donegal	Carndonagh	Recurring	Y	400616	Fluvial	5
Donegal	Pettigo	15/11/2015	N	-	Fluvial	5
Donegal	Pettigo	05/12/2015	N	-	Fluvial	5
Donegal	Ballindrait	26/07/2013	N	-	Pluvial / Fluvial	5
Donegal	Clonmany	22/08/2017	Y	400617	Fluvial	4
Donegal	Convoy	2015	Y	10005	Fluvial	4
Donegal	Lifford	04/01/2012	Y	10008	Fluvial	4
Donegal	Ardara	Recurring	Y	380592	Pluvial	4
Donegal	Manorcunningham	01/07/2016	N	-	Pluvial	4
Donegal	Culdaff	Recurring	N	-	Tidal / Fluvial	4
Donegal	Bunbeg Derrybeg	2016	Y	385321	Fluvial	3
Donegal	Bundoran	05/12/2015	Y	354928	Fluvial	3
Donegal	Killygordon	Recurring	Y	10007	Fluvial	3
Donegal	Letterkenny	2015	Y	390607	Fluvial	3
Donegal	Quigleys Point	22/08/2017	N	-	Fluvial	3
Donegal	Doochary	Recurring	N	-	Pluvial	3
Donegal	Moville	2013	Y	400621	Tidal / Fluvial	3
Donegal	Ballindrait	Unknown	N	-	Fluvial	2
Donegal	Ballintra	15/11/2015	N	-	Fluvial	2
Donegal	Ballintra	05/12/2015	N	-	Fluvial	2
Donegal	Bridge End	2013	Y	390599	Fluvial	2
Donegal	Carndonagh	18/05/2013	Y	400616	Fluvial	2
Donegal	Castlefinn	15/11/2015	Y	10003	Fluvial	2
Donegal	Clady	15/11/2015	N	-	Fluvial	2
Donegal	Clady	05/12/2015	N	-	Fluvial	2
Donegal	Culdaff	22/08/2017	N	-	Fluvial	2
Donegal	Fahan	Recurring	N	-	Fluvial	2

Donegal	Letterkenny	26/07/2013	Y	390607	Fluvial	2
Donegal	Liscooley	Recurring	N	-	Fluvial	2
Donegal	Newtown Cunningham	2016	Y	390610	Fluvial	2
Donegal	Newtown Cunningham	2017	Y	390610	Fluvial	2
Donegal	Dunfanaghy	18/05/2013	Y	380596	Pluvial / Fluvial	2
Donegal	Muff	22/08/2017	N	-	Tidal / Fluvial	2
Donegal	Lagg	Recurring	N	-	Coastal / Tidal	1
Donegal	Letterkenny	Recurring	Y	390607	Coastal / Tidal	1
Donegal	Malin	Recurring	Y	400620	Coastal / Tidal	1
Donegal	Bridge End	22/08/2017	Y	390599	Fluvial	1
Donegal	Castleshanaghan	05/08/2014	N	-	Fluvial	1
Donegal	Convoy	Recurring	Y	10005	Fluvial	1
Donegal	Donegal	Recurring	Y	370580	Fluvial	1
Donegal	Glen Upper	05/08/2014	N	-	Fluvial	1
Donegal	Gleneely	2015	N	-	Fluvial	1
Donegal	Gleneely	Recurring	N	-	Fluvial	1
Donegal	Raphoe	Recurring	N	-	Fluvial	1
Donegal	Lifford	22/08/2017	Y	10008	Pluvial	1
Donegal	Milford	Recurring	N	-	Pluvial	1
Donegal	Rathmullan	14/11/2015	Y	390613	Pluvial / Tidal	1
Donegal	Dungloe	Recurring	Y	385339	Tidal / Fluvial	1
Donegal	Downings	2014	Y	380595	Unknown	1
Donegal	Murvagh	11/07/2014	N	-	Tidal / Fluvial	N/A
Donegal	Murvagh	24/12/2014	N	-	Tidal / Fluvial	N/A
Dublin	Killiney	02/08/2014	Y	90082	Fluvial	40
Dublin	Ballsbridge	14/11/2014	Y	90082	Groundwater	10
Dublin	Dalkey	02/03/2018	Y	90082	Coastal / Tidal	6
Dublin	Monkstown	02/03/2018	Y	90082	Coastal / Tidal	5
Dublin	Ballybrack	02/08/2014	Y	100121	Fluvial	4
Dublin	Gasthule	02/03/2018	Y	90082	Coastal / Tidal	3
Dublin	Kilternan	2012	N	-	Fluvial	3
Dublin	Kilternan	2015	N	-	Fluvial	3
Dublin	Baldoyle	03/01/2014	Y	90102	Coastal / Tidal	2
Dublin	Howth	10/08/2014	N	-	Fluvial	2
Dublin	Rathcoole	07/03/2016	N	-	Pluvial	2
Dublin	Dublin City	03/01/2014	Y	90082	Coastal / Tidal	1
Dublin	Sandymount	06/01/2014	Y	90082	Coastal / Tidal	1
Dublin	Tallaght	01/05/2012	Y	90082	Fluvial	1
Dublin	Dublin City	25/07/2013	Y	90082	Pluvial	1
Dublin	Rathfarnham	14/11/2014	Y	90082	Pluvial	1
Dublin	Clontarf	13/12/2012	Y	90082	Coastal / Tidal	N/A
Dublin	Dublin City	14/06/2016	Y	90082	Pluvial	N/A
Galway	Galway City and Salthill	02/01/2018	Y	300502	Coastal / Tidal	311
Galway	Galway City and Salthill	01/02/2014	Y	300502	Coastal / Tidal	107
Galway	Ahascragh	05/12/2015	Y	263234	Fluvial	29

Galway	Ballinasloe	18/12/2013	Y	260451	Fluvial	25
Galway	Ballinasloe	06/12/2015	Y	260451	Fluvial	25
Galway	Kinvarra	02/01/2018	Y	290487	Coastal / Tidal	17
Galway	Gort	01/12/2015	Y	294338	Pluvial / GW	16
Galway	Galway City and Salthill	03/01/2014	Y	300502	Coastal / Tidal	14
Galway	Clifden	13/09/2015	Y	320523	Fluvial	13
Galway	Athenry	01/12/2015	Y	294227	Pluvial / GW	10
Galway	Leenane	02/01/2018	N	-	Coastal / Tidal	7
Galway	Ballygar	01/12/2015	N	-	Fluvial	6
Galway	Tierneevin	2015	N	-	Pluvial / GW	6
Galway	Oranmore	02/01/2018	Y	290490	Coastal / Tidal	5
Galway	Clonfert	01/12/2015	N	-	Fluvial	5
Galway	Oughterard	01/12/2015	Y	300508	Pluvial / Fluvial	5
Galway	Mountbellew	01/12/2015	N	-	Pluvial / GW	5
Galway	Northampton	2015	N	-	Pluvial / GW	5
Galway	Skehanagh	2015	N	-	Pluvial / GW	5
Galway	Roundstone	03/01/2014	Y	310521	Coastal / Tidal	4
Galway	New Inn	01/12/2015	N		Fluvial	4
Galway	Grannagh	2015	N	-	Pluvial / GW	4
Galway	Portumna	01/12/2015	Y	250437	Pluvial / GW	4
Galway	Clarinbridge	02/01/2018	N	-	Coastal / Tidal	3
Galway	Indreabhan	Unknown	N	-	Fluvial	3
Galway	Kilchreest	Recurring	N	-	Fluvial	3
Galway	Kilconnell	01/12/2015	N	-	Fluvial	3
Galway	GortyMadden	Unknown	N	-	Pluvial	3
Galway	Glenbrack	2015	N	-	Pluvial / GW	3
Galway	Kiltormer	01/12/2015	N	-	Pluvial / GW	3
Galway	Labane	2015	N	-	Pluvial / GW	3
Galway	Kilkieran	01/12/2015	N	-	Fluvial	2
Galway	Roxborough	2015	N	-	Fluvial	2
Galway	Tuam	01/12/2015	Y	300510	Fluvial	2
Galway	Craughwell	01/12/2015	N	-	Pluvial / Fluvial	2
Galway	Ardrahan	2015	N	-	Pluvial / GW	2
Galway	Barnadearg	01/12/2015	N	-	Pluvial / GW	2
Galway	Caherglassaun	2015	N	-	Pluvial / GW	2
Galway	Clonbur	01/12/2015	N	-	Pluvial / GW	2
Galway	Cockstown, Labane	2015	N	-	Pluvial / GW	2
Galway	Fohenagh	01/12/2015	N		Pluvial / GW	2
Galway	Glentane	01/12/2015	N		Pluvial / GW	2
Galway	Kiltartan	2015	N	-	Pluvial / GW	2
Galway	Lydacan	2015	N	-	Pluvial / GW	2
Galway	Roscahill	01/12/2015	N	-	Pluvial / GW	2
Galway	Ballyconneely	02/01/2018	N	-	Coastal / Tidal	1
Galway	Galway City and Salthill	16/10/2017	Y	300502	Coastal / Tidal	1
Galway	Ballinasloe	Unknown	Y	260451	Fluvial	1

Galway	Clonbur	01/12/2015	N	-	Fluvial	1
Galway	Corrofin	01/12/2015	Y	300499	Fluvial	1
Galway	Craughwell	Unknown	N	-	Fluvial	1
Galway	Aughrim	01/12/2015	N		Pluvial	1
Galway	Ballinasloe	01/12/2015	Y	260451	Pluvial	1
Galway	Clonbern, Tuam	2015	Y	300510	Pluvial	1
Galway	Woodford	01/01/2018	N	-	Pluvial	1
Galway	Loughrea	01/12/2015	Y	290489	Pluvial / Fluvial	1
Galway	Moycullen	01/12/2015	N	-	Pluvial / Fluvial	1
Galway	Ahascragh	2012	Y	263234	Pluvial / GW	1
Galway	Ardrahan	01/12/2015	N	-	Pluvial / GW	1
Galway	Athenry	Unknown	Y	294227	Pluvial / GW	1
Galway	Ballynastaig	2015	N	-	Pluvial / GW	1
Galway	Caheradangan	01/12/2015	N	-	Pluvial / GW	1
Galway	Caltra	01/12/2015	N		Pluvial / GW	1
Galway	Castledaly	01/12/2015	N	-	Pluvial / GW	1
Galway	Clonfert	2014	N	-	Pluvial / GW	1
Galway	Corrandulla	01/12/2015	N	-	Pluvial / GW	1
Galway	Curragh	01/12/2015	N		Pluvial / GW	1
Galway	Headford	01/12/2015	N	-	Pluvial / GW	1
Galway	Kinvarra	01/12/2015	Y	290487	Pluvial / GW	1
Galway	Moylough	01/12/2015	N	-	Pluvial / GW	1
Galway	Peterswell	01/12/2015	N	-	Pluvial / GW	1
Galway	Galway City and Salthill	18/12/2013	Y	300502	Coastal / Tidal	N/A
Galway	Galway City and Salthill	06/12/2015	Y	300502	Coastal / Tidal	N/A
Galway	Galway City and Salthill	02/01/2016	Y	300502	Coastal / Tidal	N/A
Galway	Kinvarra	05/01/2016	Y	290487	Coastal / Tidal	N/A
Galway	Camus	01/12/2015	N	-	Fluvial	N/A
Galway	Claregalway	31/01/2014	Y	300497	Fluvial	N/A
Galway	Esker	01/12/2015	N	-	Fluvial	N/A
Galway	Kylemore	2015	N		Fluvial	N/A
Galway	Kylemore	01/12/2015	N	-	Fluvial	N/A
Galway	Meelick	01/12/2015	N	-	Fluvial	N/A
Galway	Muckanagh	01/12/2015	N	-	Fluvial	N/A
Galway	Galway City and Salthill	28/01/2013	Y	300502	Pluvial	N/A
Kerry	Tralee	05/12/2015	Y	230361	Fluvial	34
Kerry	Ballylongford	03/01/2014	Y	240370	Coastal / Tidal	28
Kerry	Ballylongford	01/02/2014	Y	240370	Coastal / Tidal	26
Kerry	Castleisland	24/01/2014	Y	220323	Fluvial	20
Kerry	Caherciveen	04/10/2016	Y	220323	Pluvial	12
Kerry	Ballybunnion	01/02/2014	N	-	Coastal / Tidal	6
Kerry	Portmagee	04/10/2016	Y	220340	Pluvial	6
Kerry	Listowel	22/11/2017	Y	230357	Pluvial / Fluvial	5
Kerry	Killorglin	02/01/2014	N		Coastal / Tidal	4
Kerry	Ballyduff	22/11/2017	N	-	Fluvial	4

Kerry	Causeway	22/11/2017	N	-	Fluvial	4
Kerry	Killarney	05/12/2015	Y	220337	Fluvial	4
Kerry	Ballyheigue	22/11/2017	N	-	Fluvial	3
Kerry	Firies	18/12/2018	N	-	Fluvial	3
Kerry	Blennerville	01/02/2014	N	-	Coastal / Tidal	2
Kerry	Cromane	02/01/2014	N		Coastal / Tidal	1
Kerry	Tralee	08/02/2016	Y	230361	Coastal / Tidal	1
Kerry	Tralee	11/09/2015	Y	230361	Fluvial	N/A
Kerry	Kenmare	05/12/2015	Y	210312	Pluvial	N/A
Kerry	Glenflesk	05/12/2015	Y	225502	Pluvial / Fluvial	N/A
Kildare	Levitstown	27/12/2015	N		Fluvial	5
Kildare	Kilmeague	22/11/2017	N	-	Fluvial	3
Kildare	Killeenmore	27/12/2015	N	-	Fluvial	1
Kildare	Killeenmore	22/11/2017	N	-	Fluvial	1
Kildare	Riverstown	27/12/2015	N		Fluvial	1
Kilkenny	Graiguenamanagh	27/12/2015	Y	140162	Fluvial	59
Kilkenny	Thomastown	27/12/2015	Y	150201	Fluvial	50
Kilkenny	Inistioge	27/12/2015	Y	150192	Fluvial	27
Kilkenny	Thomastown	16/03/2018	Y	150201	Fluvial	16
Kilkenny	Freshford	27/12/2015	Y	150190	Fluvial	2
Kilkenny	Freshford	16/03/2018	Y	150190	Fluvial	2
Laois	Mountmellick	22/11/2017	Y	140168	Pluvial / Fluvial	85
Laois	Portarlington	22/11/2017	Y	140173	Pluvial / Fluvial	5
Laois	Cloncannon	22/11/2017	N	-	Fluvial	3
Laois	Durrow	01/12/2015	N	-	Fluvial	3
Laois	Durrow	22/11/2017	N	-	Fluvial	3
Laois	Mountrath	22/11/2017	Y	150198	Fluvial	3
Laois	Rosenallis	22/11/2017	N	-	Fluvial	3
Laois	Mountrath	01/12/2015	Y	150198	Fluvial	2
Laois	Killenard	22/11/2017	N	-	Pluvial	2
Laois	Ballyfin	22/11/2017	N	-	Pluvial / Fluvial	2
Laois	Clonaslee	22/11/2017	Y	250420	Fluvial	1
Laois	Coolrain	22/11/2017	N	-	Fluvial	1
Laois	Castletown	22/11/2017	N	-	Pluvial	1
Laois	Portlaoise	22/11/2017	Y	140174	Pluvial	1
Laois	R430	23/11/2017	N	-	Pluvial	1
Laois	Rosenallis	13/11/2014	N	-	Pluvial	1
Leitrim	Carrick-on-Shannon	07/12/2015	Y	260455	Fluvial	4
Leitrim	Leitrim Village	07/12/2015	Y	263853	Fluvial	4
Leitrim	Kilclare	07/12/2015	N	-	Fluvial	3
Leitrim	Rossinver	07/12/2015	N	-	Fluvial	2
Leitrim	Dromod	07/12/2015	Y	263661	Fluvial	1
Leitrim	Manorhamilton	07/12/2018	Y	350557	Fluvial	1
Leitrim	Mohill	07/12/2015	Y	260466	Fluvial	1
Leitrim	Stonepark	07/12/2015	N	-	Fluvial	1

Leitrim	Aghamore/Doora	07/12/2015	N	-	Pluvial	1
Limerick	Limerick City	01/02/2014	Y	270477	Coastal / Tidal	192
Limerick	Foynes	03/01/2014	Y	240383	Coastal / Tidal	33
Limerick	Askeaton	03/01/2014	Y	240365	Coastal / Tidal	10
Limerick	Limerick City	02/01/2018	Y	270477	Coastal / Tidal	5
Limerick	Kilbehenny	2012	N	-	Fluvial	4
Limerick	Kilmallock	01/04/2018	N	-	Pluvial	4
Limerick	Pallaskenry	Recurring	N	-	Fluvial	3
Limerick	Askeaton	02/01/2018	y	240365	Fluvial	2
Limerick	Adare	01/02/2014	Y	240364	Coastal / Tidal	1
Limerick	Annacotty	13/12/2015	Y		Fluvial	N/A
Limerick	Castleconnell	01/12/2015	Y	252889	Fluvial	N/A
Limerick	Corbally	13/12/2015	Y		Fluvial	N/A
Limerick	Doon	24/07/2014	n		Fluvial	N/A
Limerick	Foynes	11/11/2017	Y	240383	Pluvial	N/A
Louth	Drogheda	03/01/2014	Y	70033	Coastal / Tidal	162
Louth	Dunleer	14/11/2014	N		Fluvial	16
Louth	Dundalk	14/11/2014	Y	60019	Fluvial	9
Louth	Drogheda	14/11/2014	Y	70033	Fluvial	4
Louth	Termonfeckin	14/11/2014	Y	60024	Fluvial	4
Louth	Blackrock	03/01/2014	Y	60015	Coastal / Tidal	3
Louth	Dundalk	03/01/2014	Y	60019	Coastal / Tidal	3
Louth	Gallstown	14/11/2014	N		Fluvial	2
Louth	Dromiskin	27/01/2016	N	-	Pluvial	2
Louth	Ardee	30/12/2015	Y	60014	Fluvial	1
Louth	Drogheda	17/10/2012	Y	70033	Coastal / Tidal	N/A
Mayo	Ballina	03/01/2014	Y	340534	Coastal / Tidal	25
Mayo	Westport	05/12/2015	Y	320527	Fluvial	21
Mayo	Newport	03/01/2014	Y	324767	Tidal / Fluvial	1
Mayo	Crossmolina	05/12/2015	Y	340541	Fluvial	N/A
Meath	Ashbourne	13/11/2014	Y	80052	Pluvial	36
Meath	Bettystown	26/09/2012	y	70031	Fluvial	20
Meath	Kells	01/01/2017	N	-	Pluvial / Fluvial	4
Meath	Bettystown	Recurring	Y	70031	Pluvial / Fluvial	2
Meath	Trim	22/01/2017	Y	70041	Fluvial	1
Meath	Trim	01/11/2017	Y	70041	Pluvial / Fluvial	1
Monaghan	Monaghan	05/12/2015	Y	30011	Fluvial	41
Monaghan	Carrickmacross	31/12/2015	Y	60017	Pluvial	4
Monaghan	Coolshannagh	05/12/2015	N	-	Fluvial	2
Monaghan	Milltown	05/12/2015	N	-	Fluvial	2
Monaghan	Mullen	05/12/2015	N	-	Fluvial	2
Monaghan	Sillis	05/12/2015	N	-	Fluvial	2
Monaghan	Ballyalbany	05/12/2015	N	-	Fluvial	1
Monaghan	Monmurry	05/12/2015	N	-	Fluvial	1
Monaghan	Clones	05/12/2015	N	-	Pluvial	1

Offaly	Shannon Harbour	01/12/2015	Y	255470	Fluvial	4
Offaly	Banagher	01/12/2015	N		Fluvial	2
Offaly	Pollagh	01/12/2015	Y	250436	Fluvial	2
Roscommon	Roscommon	01/12/2015	Y	260468	Fluvial	12
Roscommon	Athleague	01/12/2015	Y	265481	Fluvial	N/A
Sligo	Rathbraughan	05/12/2015	Y	350561	Fluvial	21
Sligo	Ballysadare	06/12/2015	Y	350548	Fluvial	7
Sligo	Sligo	02/01/2014	Y	350561	Coastal / Tidal	2
Sligo	Ballybeg	01/12/2015	N	-	Pluvial / GW	1
Sligo	Sligo	20/01/2018	Y	350561	Coastal / Tidal	N/A
Tipperary	Carrick on Suir	30/12/2015	Y	160212	Fluvial	23
Tipperary	Killenaule	13/08/2012	N	-	Pluvial	13
Tipperary	Clonmel	14/11/2014	Y	160216	Pluvial	9
Tipperary	Ballinonty	13/08/2012	N	-	Fluvial	6
Tipperary	Clonmel	30/12/2015	Y	160216	Fluvial	6
Tipperary	Moyglass	13/08/2012	N	-	Fluvial	4
Tipperary	Ballysloe	13/08/2012	N	-	Fluvial	3
Tipperary	Killaloe	30/12/2015	Y	250427	Fluvial	3
Tipperary	Nenagh	30/12/2015	Y	250432	Fluvial	3
Tipperary	Poulmucka	14/11/2014	N	-	Pluvial	2
Tipperary	Fethard	13/08/2012	Y	160219	Fluvial	1
Tipperary	Ardfinnan	14/11/2014	Y	160205	Pluvial	1
Tipperary	Cahir	14/11/2014	Y	160211	Pluvial	1
Tipperary	Gortnahoe	03/01/2014	N	-	Pluvial	1
Tipperary	Knockagh	14/11/2014	N	-	Pluvial	1
Waterford	Waterford City	03/02/2014	Y	160242	Coastal / Tidal	45
Waterford	Passage East	03/02/2014	N		Coastal / Tidal	33
Waterford	Tramore	15/12/2018	Y	172231	Fluvial	7
Waterford	Tramore	05/01/2014	Y	172231	Coastal / Tidal	6
Waterford	Tramore	28/11/2018	Y	172231	Coastal / Tidal	6
Waterford	Waterford City	Recurring	Y	160242	Coastal / Tidal	6
Waterford	Clonea Power	Recurring	N	-	Pluvial / Fluvial	6
Waterford	Dungarvan	03/02/2014	Y	170244	Coastal / Tidal	4
Waterford	Cheekpoint	03/02/2014	N		Coastal / Tidal	3
Waterford	Six Cross Roads	Recurring	Y	160242	Pluvial	3
Waterford	Waterford City	Recurring	Y	160242	Pluvial	3
Waterford	Portlaw	Recurring	Y	162103	Fluvial	2
Waterford	Tallowbridge	Recurring	N	-	Fluvial	2
Waterford	Ballinamult	01/12/2015	N	-	Pluvial / Fluvial	2
Waterford	Tallow	29/12/2015	Y	180266	Pluvial / Fluvial	2
Waterford	Woodstown	20/12/2016	N	-	Pluvial / Tidal	2
Waterford	Tramore	11/10/2018	Y	172228	Coastal / Tidal	1
Waterford	Aglish	14/11/2014	Y	180247	Fluvial	1
Waterford	Clashmore	14/11/2014	N	-	Pluvial	1
Waterford	Lemybrien	Recurring	N	-	Pluvial	1

Waterford	Portlaw	2015	Y	162103	Pluvial	1
Waterford	Portlaw	14/12/2018	Y	162103	Pluvial	1
Waterford	Ballylaneen	Recurring	N	-	Pluvial / Fluvial	1
Waterford	Lacken Bridge	Recurring	Y	160242	Pluvial / Fluvial	1
Waterford	Portlaw	01/12/2018	Y	172230	Pluvial / Fluvial	1
Westmeath	Athlone	01/12/2015	Y	260448	Fluvial	22
Wexford	Enniscorthy	27/12/2015	Y	120137	Fluvial	67
Wexford	Enniscorthy	13/11/2014	Y	120137	Tidal / Fluvial	38
Wexford	Arthurstown	03/02/2014	N		Coastal / Tidal	25
Wexford	Wexford	25/11/2012	Y	120142	Pluvial	19
Wexford	Ballyhack	03/02/2014	N		Coastal / Tidal	12
Wexford	Bridgetown	25/11/2012	N	-	Coastal / Tidal	4
Wexford	New Ross	02/01/2014	Y	141599	Tidal / Fluvial	4
Wexford	Campile	03/02/2014	N		Coastal / Tidal	2
Wexford	Wellington Bridge	03/02/2014	N		Coastal / Tidal	2
Wexford	Portergate	13/11/2014	N	-	Pluvial	2
Wexford	Bunclody	27/12/2015	Y	120133	Fluvial	1
Wexford	Rosslare	13/11/2014	N		Pluvial	1
Wicklow	Wicklow	02/03/2018	Y	100124	Coastal / Tidal	3
Wicklow	Aughrim	14/11/2014	Y	100111	Fluvial	1

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APPENDIX B

Structures that Supported the PFRA, the National CFRAM Programme and the Review of the PFRA

Interdepartmental Flood Policy Co-ordination Group

The Group is chaired by the Minister of State with special responsibility for the Office of Public Works and Flood Relief and membership includes:

- Office of Public Works
- County and City Management Association
- Department of Agriculture, Food and the Marine
- Department of Business, Enterprise and Innovation
- Department of Communications, Climate Action and Environment
- Department of Culture, Heritage and the Gaeltacht
- Department of Defence
- Department of Employment Affairs and Social Protection
- Department of Finance
- Department of Housing, Planning and Local Government
- Department of Public Expenditure and Reform
- Department of Transport, Tourism and Sport

National Floods Directive Coordination Group

- Office of Public Works
- County and City Management Association
- Department of Agriculture, Food and the Marine
- Department of Culture, Heritage and the Gaeltacht
- Department of Housing, Planning and Local Government
- Department for Infrastructure (DfI), Rivers (formerly Rivers Agency Northern Ireland)
- Environmental Protection Agency
- Electricity Supply Board
- Geological Survey of Ireland (Department of Communications, Climate Action and Environment)
- Irish Water
- Met Éireann
- Office of Emergency Planning
- Waterways Ireland

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APPENDIX C

APSFRs Designated for the Second Cycle

The communities listed below are designated as APSFRs for the purpose of the second cycle of implementation of the 'Floods' Directive.

APFRS ID No.	APSFR (Community) Name	County
140155	Carlow	Carlow
140166	Leighlinbridge	Carlow
120141	Tullow	Carlow
360572	Cavan	Cavan
270471	Bunratty	Clare
270474	Ennis	Clare
270475	Kilkee	Clare
250427	Killaloe	Clare
270476	Kilrush	Clare
250434	O'Brien's Bridge & Montpellier	Clare
270481	Shannon	Clare
270482	Sixmilebridge	Clare
259015	Springfield	Clare
195499	Ballingeary	Cork
190292	Ballymakeery / Ballyvourney	Cork
200293	Bandon	Cork
210307	Bantry	Cork
190289	Carrigaline	Cork
190277	Castlemartyr	Cork
210308	Castletown Bearhaven	Cork
200294	Clonakilty	Cork
190286	Cork City	Cork
190291	Douglas	Cork
200297	Dunmanway	Cork
180252	Fermoy	Cork
180253	Freemount	Cork
190290	Glanmire	Cork
190268	Inchigeelagh	Cork
200298	Inishannon	Cork
180254	Kanturk	Cork
190284	Little Island	Cork
190270	Macroom	Cork
180262	Mallow	Cork
190279	Midleton & Ballynacorra	Cork
180265	Rathcormack	Cork
200303	Schull	Cork
200302	Skibbereen	Cork

190288	Togher	Cork
190280	Tower	Cork
180267	Youghal	Cork
10002	Ballybofey / Stranorlar	Donegal
385321	Bunbeg Derrybeg	Donegal
390600	Buncrana & Luddan	Donegal
390601	Burnfoot	Donegal
400616	Carndonagh	Donegal
380594	Carrowkeel	Donegal
10003	Castlefinn	Donegal
10005	Convoy	Donegal
370580	Donegal	Donegal
380595	Downies	Donegal
380596	Dunfanaghy	Donegal
380597	Glenties	Donegal
370585	Killybegs	Donegal
390607	Letterkenny	Donegal
10008	Lifford	Donegal
400621	Moville	Donegal
10648	Raphoe	Donegal
390611	Rathmelton	Donegal
390613	Rathmullan	Donegal
90071	Balgriffin	Dublin
90082	Dublin City	Dublin
91086	Hazelhatch	Dublin
100121	Loughlinstown	Dublin
90090	Lucan to Chapelizod	Dublin
90091	Malahide	Dublin
90093	Mulhuddart	Dublin
105456	Old Connaught / Wilford	Dublin
80061	Rush	Dublin
90099	Santry	Dublin
80062	Skerries	Dublin
90103	Sutton & Howth North	Dublin
90104	Swords (south)	Dublin
100114	Bray	Dublin & Wicklow
263234	Ahascragh	Galway
260451	Ballinasloe	Galway
300497	Claregalway	Galway
320523	Clifden	Galway
300499	Corrofin	Galway
300502	Galway City	Galway
294338	Gort	Galway
250437	Portumna	Galway
230341	Abbeydorney	Kerry

240370	Ballylongford	Kerry
230345	Banna	Kerry
220323	Castleisland	Kerry
220327	Dingle	Kerry
225502	Glenflesk	Kerry
210312	Kenmare	Kerry
220337	Killarney	Kerry
230357	Listowel	Kerry
230361	Tralee	Kerry
220999	Tullig	Kerry
140150	Athy	Kildare
140156	Castledermot	Kildare
90076	Celbridge	Kildare
90078	Clane	Kildare
90089	Leixlip	Kildare
90092	Maynooth	Kildare
90094	Naas	Kildare
90095	Newbridge	Kildare
140178	Suncroft	Kildare
90105	Turnings	Kildare
150181	Ballyhale	Kilkenny
150185	Callan	Kilkenny
150190	Freshford	Kilkenny
140162	Graiguenamanagh	Kilkenny
150192	Inistioge	Kilkenny
150194	Kilkenny Breagagh	Kilkenny
150193	Kilkenny Nore	Kilkenny
160235	Piltown	Kilkenny
150201	Thomastown	Kilkenny
250420	Clonaslee	Laois
140168	Mountmellick	Laois
150198	Mountrath	Laois
140173	Portarlington	Laois
140174	Portlaoise	Laois
150200	Rathdowney	Laois
260455	Carrick on Shannon	Leitrim
263661	Dromod	Leitrim
263853	Leitrim	Leitrim
260466	Mohill	Leitrim
240364	Adare	Limerick
240365	Askeaton	Limerick
232630	Athea	Limerick
250415	Cappamore	Limerick
252889	Castleconnell	Limerick
242722	Dromcolliher	Limerick

240383	Foynes	Limerick
270477	Limerick City & Environs	Limerick
240392	Newcastle West	Limerick
240394	Rathkeale	Limerick
260464	Longford	Longford
60013	Annagassan	Louth
60014	Ardee	Louth
70030	Baltray	Louth
60015	Blackrock South	Louth
60016	Carlingford & Greenore	Louth
60019	Dundalk	Louth
60024	Termonfeckin	Louth
70033	Drogheda	Louth & Meath
340534	Ballina & Environs	Mayo
340541	Crossmolina	Mayo
340542	Foxford	Mayo
320526	Louisburgh	Mayo
340543	Swinford	Mayo
320527	Westport	Mayo
80052	Ashbourne	Meath
70031	Bettystown	Meath
90079	Clonee	Meath
80056	Duleek	Meath
90083	Dunboyne	Meath
70880	Mornington	Meath
70039	Navan	Meath
80060	Ratoath	Meath
365068	Ballybay	Monaghan
60020	Inishkeen	Monaghan
30011	Monaghan	Monaghan
250410	Birr	Offaly
250438	Rahan	Offaly
250443	Tullamore	Offaly
265481	Athleague	Roscommon
260454	Boyle	Roscommon
260468	Roscommon	Roscommon
350550	Coolaney	Sligo
350561	Sligo Town / Rathbraghan	Sligo
160205	Ardfinnan	Tipperary
160210	Borrisoleigh	Tipperary
160211	Cahir	Tipperary
160212	Carrick on Suir	Tipperary
160216	Clonmel	Tipperary
160219	Fethard	Tipperary
160221	Golden	Tipperary

160231	Mullinahone	Tipperary
250432	Nenagh	Tipperary
160233	Newcastle	Tipperary
250433	Newport	Tipperary
250440	Roscrea	Tipperary
160238	Templemore	Tipperary
160239	Thurles	Tipperary
180247	Aglish	Waterford
180248	Ballyduff	Waterford
170244	Dungarvan & Environs	Waterford
170246	Ringphuca	Waterford
160242	Waterford	Waterford
260448	Athlone	Westmeath
250431	Mullingar	Westmeath
120137	Enniscorthy	Wexford
141599	New Ross & Environs	Wexford
120142	Wexford	Wexford
100109	Arklow	Wicklow
100110	Ashford & Rathnew	Wicklow
100111	Aughrim	Wicklow
100112	Avoca	Wicklow
120132	Baltinglass	Wicklow
90074	Blessington	Wicklow
100117	Greystones & Environs	Wicklow
100118	Kilcoole	Wicklow
100122	Newcastle	Wicklow
100124	Wicklow	Wicklow

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