

# Sustainable Water

## A Long Term Water Strategy for Northern Ireland

### Part 3: Flood Risk Management and Drainage



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# Setting the Scene

## Introduction

01. There have been a number of flood events in Northern Ireland in recent years and these have demonstrated the potential for widespread impact and our vulnerability to this risk. The impact of flooding on individual households, communities and business can be devastating.
02. Extreme weather resulting in flooding of properties and infrastructure is also expected to be a significant long term risk associated with climate change for Northern Ireland<sup>01</sup>.

This chapter considers how flood risk can be sustainably managed to facilitate social, economic and environmental development. The following will be examined:

- The sources and level of flood risk in Northern Ireland;
- Our drainage and flood defence infrastructure;
- Some of the challenges to be addressed; and
- A long term vision and strategy for managing flood risk;



01 DEFRA, 2012. UK Climate Change Risk Assessment: Climate Change Risk Assessment for Northern Ireland - [http://www.doeni.gov.uk/climate\\_change\\_risk\\_assessment\\_ni\\_2012.pdf](http://www.doeni.gov.uk/climate_change_risk_assessment_ni_2012.pdf)

- 03.** It is important to recognise that eliminating all flooding is not a realistic objective. However, this should not prevent action being taken. This chapter proposes steps that must be taken by government organisations and wider society to move towards a more sustainable management of flood risk.

### Definition of Flooding

- 04.** Flooding is the covering of normally dry land by water. The regular wetting of land adjacent to a river is part of the natural process. However, where flood waters negatively impact upon human health, the environment, economic activity or cultural heritage then this is unacceptable and should, where possible, be managed.

### Our Wet Climate

- 05.** Northern Ireland has a wet climate and the natural landscape incorporates many water features including the coast, meandering rivers, streams, ponds, wetlands, bogs and wet woodland. Records kept at Armagh Observatory show that we have had a number of very wet summers in recent years. Over the ten year period 2002-11 on average 27% of annual rainfall fell during the summer months (June to August). In 2007 45% of the annual rainfall occurred in these three summer months. This is why we have seen widespread flooding from surface water, sewers and rivers. More statistics on rainfall can be viewed in the Annual NI Environmental Statistics Report<sup>02</sup>.

### Sources and level of flood risk

- 06.** The significant sources of flooding in Northern Ireland are rivers, the sea, surface water, and reservoirs. In addition flooding can occur as a result of overloaded or blocked sewers. It is estimated that 46,000 (5%) of the 830,000 properties in Northern Ireland could be at significant risk from flooding due to their location in coastal or river flood plains<sup>03</sup>. Approximately one third of these properties are protected to some extent by flood defence systems and the culvert network<sup>04</sup>. In addition, the surface water flood map for Northern Ireland indicates that around 20,000 (2.5%) of properties are sited in an area that is shown to be at risk of flooding from a significant rainfall event<sup>05</sup>.
- 07.** The estimated number of properties at flood risk in Northern Ireland is however lower than other parts of the UK. The figures above show that approximately 1 in 18 properties are at flood risk from rivers and the sea in Northern Ireland. In England and Wales 1 in 6 properties are claimed to be at flood risk<sup>06</sup>, while in Scotland it is 1 in 22 homes and 1 in 13 businesses which are at risk<sup>07</sup>.

02 <http://www.doeni.gov.uk/ni-environmental-statistics-report-2013.pdf>

03 Preliminary Flood Risk Assessment and Methodology for Identification of Significant Flood Risk Areas in Northern Ireland, DARD, Dec 2011. DARD estimates that 5% of properties are located within the un-defended 1 in 100yr (1% Annual Exceedance Probability (AEP)) river floodplain or 1 in 200yr (0.5% AEP) coastal floodplain.

04 DARD estimates that 15,500 of the 46,000 properties at risk have some form of flood defence in place.

05 Risk of flooding to a depth greater than 300mm from a 1 in 200yr (0.5% AEP) rainfall event.

06 Flooding in England: A National Assessment of Flood Risk, 2009, Environment Agency.

07 The National Flood Risk Assessment, 2011, SEPA

## Drainage Systems

- 08.** Our drainage systems are a network of private and publicly owned sewers, drains, culverts and rivers. These systems are managed and operated by private landowners and a number of public bodies including DARD, Transport NI and Northern Ireland Water. Public bodies have invested heavily in improving drainage systems and flood defences over many years. Private landowners are responsible for the drainage of their own property<sup>08</sup>.
- 09.** The majority of rainwater that falls on hard surfaces such as roofs, footpaths and roads in towns and cities is drained by our public drainage systems. Many sewers were constructed in Victorian times to take wastewater and sewage to the nearest river, as the focus then was on reducing disease and illness caused by poor sanitation. However, discharging

wastewater which contains raw sewage directly into rivers can cause pollution. EU environmental standards now require wastewater to undergo appropriate treatment before being returned to the environment.

- 10.** Many of our urban drainage systems are combined, carrying both stormwater and sewage. This means that rainwater is often pumped and treated like sewage. Excessive rainfall can overload sewerage systems by exceeding the economic design capacity of combined sewers. This can result in out of sewer flooding and pollution. Combined Sewer Overflows (CSOs) are a necessary part of the system to reduce the risk of overloading of sewers. However, these overflows should only operate during heavy rainfall. Where CSOs spill too frequently and cause pollution these are categorised as Unsatisfactory Intermittent Discharges (UIDs) which must be rectified.



Belfast Sewers Project

08 NI Water has a duty to provide effectual drainage for properties connected to the public sewerage system.



**11.** The £160 million Belfast Sewers tunnel was constructed to reduce pollution of the River Lagan, reduce flooding and facilitate future development. The project involved the upgrade of over 500 sewers and the construction of over 9.5 km of storm tunnels up to 4 metres in diameter. However large sewer tunnels cannot be used to deal with all our future drainage needs. They are very expensive to construct and operate, and the on-going pumping and treatment of millions of cubic metres of rainwater requires large amounts of energy and chemicals. Our long-term aim must be to reduce the amount of rainwater entering into combined sewerage systems from road and land drainage, and instead manage surface water in a different way.

### Flood Defence Infrastructure

- 12.** There are about 60 flood and sea defence systems across Northern Ireland which offer protection to our major towns and large swathes of agricultural land. A number of flood alleviation works are delivered each year to increase the level of protection to property in areas where flooding has occurred.
- 13.** Looking forward, the construction of ever larger flood walls, extending flood banks and increasing the flow capacity of our rivers after flood events may not represent the best use of finite flood alleviation funding. It is also unsustainable to attempt to build structures to keep rivers and the sea at bay in all circumstances.

River Defences in Omagh during flooding in Oct 2011



## Flood Risk Management & Drainage

### The Way Forward

**14.** If it is accepted that we are likely to experience more regular flooding events in the future, we need to act now to manage that risk. We cannot afford to keep putting bigger pipes in the ground or building taller flood defences in all cases, so we need to think differently. Therefore, the proposed long-term vision is to ‘manage flood risk and drainage in a sustainable manner’ to facilitate social, economic & environmental development. Such an approach will help make investment more effective, and reduce the future costs of maintaining and operating drainage and flood resilience infrastructure. Flooding cannot be managed effectively by government acting alone. Householders, catchment stakeholders and the insurance industry all have important roles in managing flood risk sustainably in future. This approach is in line with the aims of the European Floods Directive on the assessment and management of flood risks.

### The European Floods Directive

**15.** As flooding can have devastating impacts, protecting the needs of the community is at the heart of the Floods Directive approach. It aims to manage the adverse consequences that flooding has on human health, the environment, cultural heritage and economic activity. Flood risk is a measure of the impact of flooding and the likelihood that it will occur. While many areas may be at flood risk, the Directive requires us to identify those at significant risk and carry out further study on these areas<sup>09</sup>.

**16.** In Northern Ireland, the Department of Agriculture and Rural Development (DARD) is the Competent Authority for the implementation of the Floods Directive. A three stage strategy is being undertaken which will ensure that new plans will be in place to manage flood risk across the country by 2015. The timetable for their delivery includes:-

<b>1</b>	<b>Undertake a preliminary flood risk assessment</b> Identify Significant Flood Risk Areas (SFRAs)	<b>Completed in Dec 2011</b>
<b>2</b>	<b>Produce flood hazard &amp; flood risk maps</b> Maps to be produced for the SFRAs	<b>Completed in Dec 2013</b>
<b>3</b>	<b>Produce flood risk management plans</b> Plans will contain objectives and measures to manage flood risk in SFRAs	<b>By Dec 2015</b>

<sup>09</sup> Significant flood risk in Northern Ireland has been determined through the Preliminary Flood Risk Assessment for Northern Ireland, 2011.

17. The process of assessment, mapping and planning is to be reviewed in 6 year cycles, coordinated and synchronised with the Water Framework Directive. More information on the Floods Directive implementation can be found at <http://www.dardni.gov.uk/riversagency/eu-floods-directive.htm>.

### Challenges to Flood Risk Management & Drainage

18. Some of the key challenges to managing future flood risk are:

- Climate Change – predictions indicate that it is likely that there will be more high intensity rainfall events which will overwhelm the urban drainage systems and overtop existing flood defences more regularly.
- Development and Growth – development and growth in green (and brown) spaces places more pressure on our sewerage and drainage systems leading to increased flood risk particularly from surface water.
- Environmental Protection & Improvement – the need to reduce pollution from run-off and from sewerage overflows during rainfall events to meet EU standards will place further pressures on our sewers and drainage systems.
- Poor Land Management Practices – the way we manage land across the catchment influences the volume and speed of rainwater entering rivers and drainage systems. In addition the movement of sediment within rivers can cause changes over time which

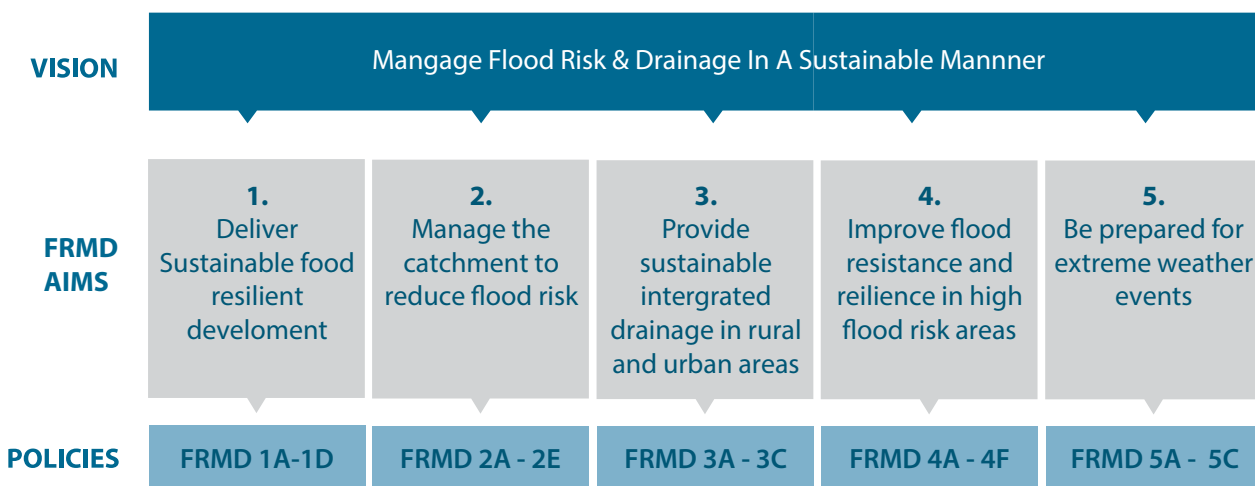
can reduce flow capacity.

- Funding – in the current economic climate it is unlikely that we can afford to increase the level of investment in heavily engineered drainage and flood protection measures.
- Effective Surface Water Management – the identification of surface water as a significant flood risk may require a new approach to drainage provision, including better coordination between drainage providers.

19. The Northern Ireland Climate Change Adaption Programme recognised flooding as one of four primary areas for action. A range of high level actions and activities have been put in place by all Governments Departments to address priority flooding climate change risks.

## Proposed Flood Risk Management Strategy

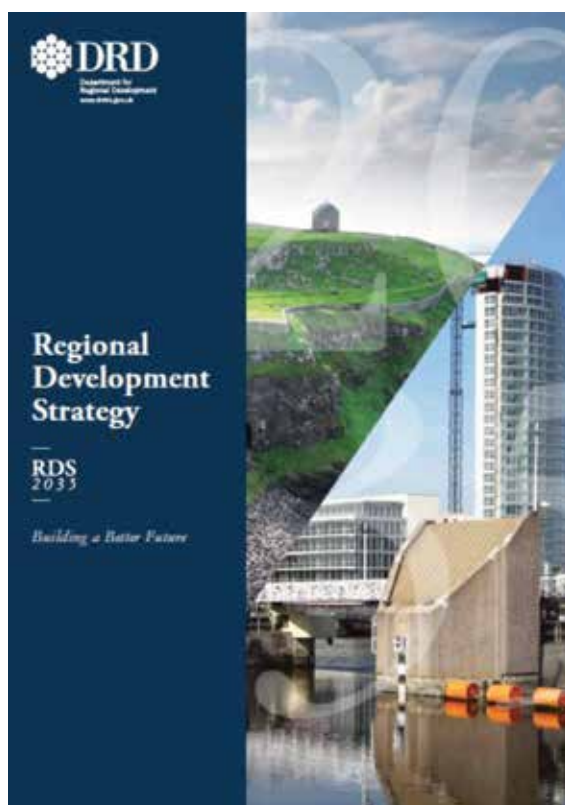
20. To meet our obligations under the Floods Directive and meet these challenges, we need a long-term strategy for managing flood risk in NI. The proposed flood risk management strategy is set-out in the remaining sections of this chapter and is structured around the vision and a number of key aims. The strategy structure is below.



# FRMD Aim 1:

## Deliver Sustainable Flood Resilient Development

- 21.** Sustainable development in flood risk management terms is development which does not increase flood risk, either locally or in another part of the catchment, and does so in a way that meets the needs of future generations. This means avoiding development in flood prone areas. It also means avoiding the collection and treatment of rainwater in combined sewers as this involves significant carbon emissions, energy requirements and operating costs. Resilient development is about building homes and industrial developments that are capable of withstanding extreme rainfall events with minimal or no flood damage.
- 22.** The Regional Development Strategy (RDS) provides an overarching strategic planning framework to facilitate and guide the public and private sectors. Through Regional Guidance (RG9/12), the RDS recommends:
- A precautionary approach to development in flood risk areas using the latest flood risk information that is available.
  - That we develop our towns and cities in a manner that avoids the risk where possible.
  - That development should incorporate Sustainable Drainage Systems (SuDS).
  - That all new urban storm water drainage systems should incorporate measures to manage the flow of waters which exceed design standards (exceedance flows) in order to help protect vulnerable areas.
- 23.** The RDS recommendations are to be implemented through the following proposed flood risk management policies (FRMD 1A – 1D).



## FRMD Policy 1A

To ensure land-use planning decisions are informed to help minimise flood risk

**24.** It is important the planning system takes full and proper account of flood risk. This means preventing most forms of development in flood risk areas and ensuring that surface water from new developments is properly managed and does not overwhelm existing sewers or watercourses, increasing the risk of flooding elsewhere in a catchment. Where possible, surface water connections to the combined sewer network should be avoided for environmental and public health reasons. The proposed policy is to ensure that planning decisions (either through the development plan process or the determination of planning applications) and policies are informed by up-to-date information on flood risk management. Planning Policy Statement 15 (PPS15), which sets out a number of important flood risk policies, is under review. The revised PPS15 will reflect the level of flood risk information now available through the detailed flood modelling and mapping work for the Floods Directive and require developers to take account of this in bringing forward proposals.

### FRMD 1A Proposed Measures:

- Prevent inappropriate development in high flood risk areas and ensure that future development does not increase flood risk.
- Building standards should be reviewed to ensure that these requirements contribute to reducing flood risk.
- Land-use planning decisions must continue to be informed by up-to-date information on the risk from all significant sources of flooding.
- Any exceptional development permitted within high flood risk areas must make provision for adequate mitigation measures commensurate with the flood risk to the development and elsewhere as a result of it.
- Where possible surface water drainage systems (e.g. from roads, housing developments and car parks) should not be connected to the combined sewer system.

## FRMD Policy 1B:

Adequately cater for surface water management in development plans

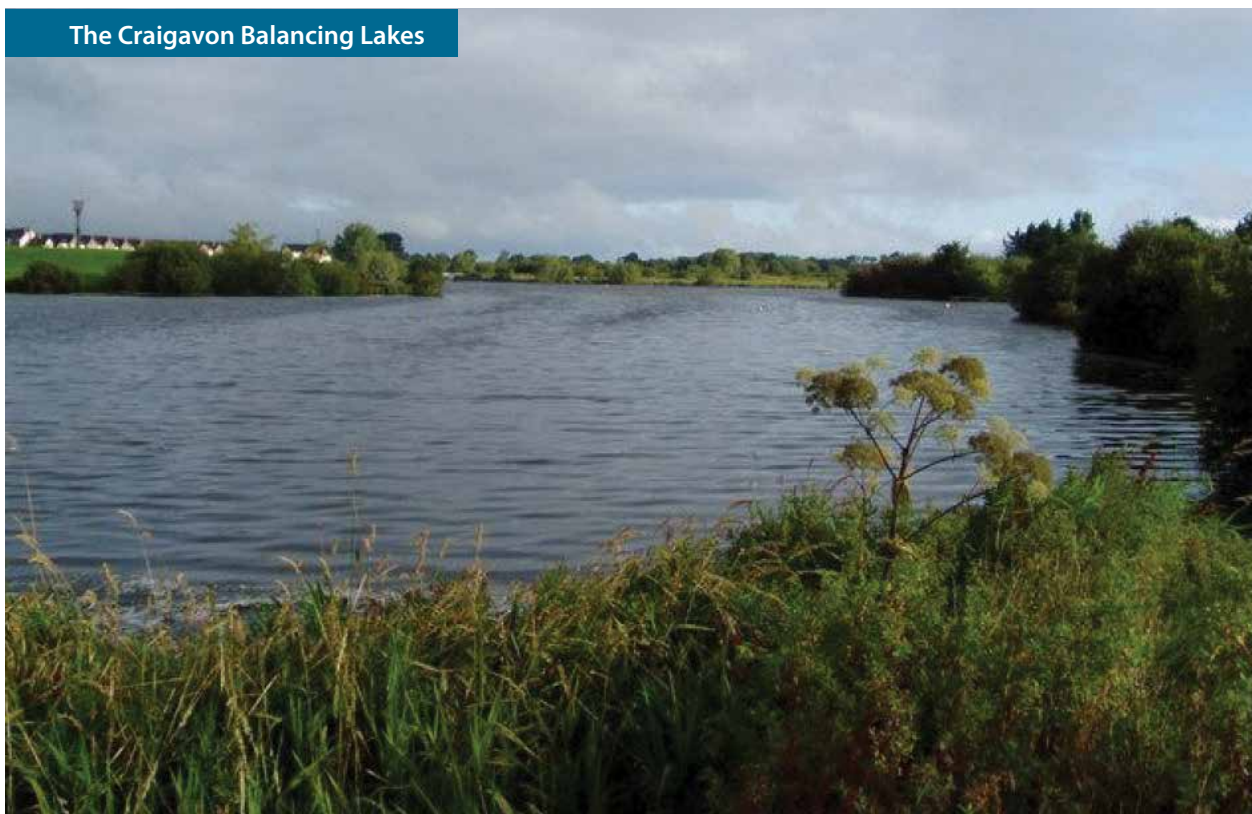
25. NI is moving towards a planning led system. This means most plans will be proposed on zoned land as identified in local development plans. This will give the opportunity to consider how surface water can be best dealt with and hence inform the design process. By zoning suitable land through development plans, large surface water drainage schemes such as lakes, wetlands and wet woodland could be created to meet the future drainage needs of the proposed development in an area. This water can also provide environmental and recreational value. For example, the Craigavon Balancing Lakes were created in the early 1970's to take rainwater from built up areas of Craigavon. They provide recreational opportunities such as water

sports, angling, and walking. The lakes have also become an important habitat for a diverse range of wildlife. The success of this policy is dependent upon early consultation and collaboration between drainage authorities and the local planning authority.

### FRMD 1B Proposed Measures:

- Develop guidance on how development proposals (including zonings in development plans) can incorporate large surface water drainage schemes made through the development planning process.
- Develop arrangements for the funding, construction and maintenance of large surface water drainage schemes in advance of development.

The Craigavon Balancing Lakes



## FRMD Policy 1C:

Sustainable drainage systems are the preferred option for managing surface water in new developments

26. If drainage is considered at the design stage of a development, surface areas and landscaping (e.g. gardens, planting, driveways, roofs and roads) can be designed to minimise surface water run-off.
27. This image shows a residential development near Inverness in Scotland where sustainable drainage was a key consideration in the design. All surface water from the streets and public spaces drains into landscaped drainage trenches (known as swales) before discharging into a nearby river.
28. This is only one of many possible sustainable drainage systems (SuDS). The choice of solution will be determined by the local characteristics of the site including its size, topography, geology, flood risk and the available discharge points (rivers, drains or sewers). It is likely that a combination of SuDS measures would need to be employed to manage the surface water in a development including: green roofs, permeable paving, swales, soak-aways, basins, ponds, wetlands, stormwater attenuation tanks and rainwater recycling. Long term maintenance, ownership and liability for SuDS remains an issue. This will need to be resolved if this approach is to be widely adopted.

Image courtesy of Civic Engineers





29. The proposed policy is to make SuDS the preferred option for managing surface water in all new developments. Any necessary changes to planning policies, development and building standards, legislation and organisational structures should be progressed as quickly as possible. In September 2011 the Northern Ireland Environment Agency (NIEA) published Managing Stormwater, a strategy for promoting the use of SuDS<sup>10</sup>. Until permanent legislative and organisational changes are made, priority should be given to implementing the recommendations in the Managing Stormwater Strategy and promoting SuDS solutions in new developments. This includes removing the right to connect surface water and road drainage to public sewers.

#### FRMD 1C Proposed Measures:

- Make the necessary changes to planning policies, development control, legislation and organisational structures to make sustainable drainage systems (SuDS) the preferred drainage option for all new developments and new drainage schemes.
- Clarify the issues with long term maintenance, ownership and liability associated with SuDS.
- Establish interim arrangements to deliver a policy of SuDS in new developments until longer term structural/legislative changes are made. Priority should be given to implementing the recommendations of the Northern Ireland Environment Agency's Managing Stormwater report<sup>11</sup>.

10 [http://www.doeni.gov.uk/niea/water-home/stormwater\\_management.htm](http://www.doeni.gov.uk/niea/water-home/stormwater_management.htm)

11 NIEA, 2011. Managing Stormwater: A Strategy for Promoting the Use of Sustainable Drainage Systems (SuDS) within Northern Ireland.

## FRMD Policy 1D:

### Design for exceedance to be incorporated into all new drainage infrastructure

**30.** When drainage systems are overwhelmed during extreme rainfall, excess rainwater can cause flooding and damage to property. 'Design for Exceedance' is about understanding what happens to the excess water when drainage systems are overwhelmed and designing measures to safely manage the water to prevent damage. For example kerbs can be used to keep rainwater on a road to be drained away safely. Rainwater can be channelled to nearby parkland or green spaces to soak away over time. The proposed policy is for 'design for exceedance' to be incorporated into all new drainage infrastructure.

#### FRMD 1D Proposed Measures:

- Develop & publish detailed Guidance on 'Design for Exceedance'.
- Relevant planning policies should be amended to make 'Design for Exceedance' a requirement in all new developments.
- Existing drainage providers should review drainage standards to ensure 'Design for Exceedance' is included in all new drainage schemes.

# FRMD Aim 2:

## Manage the Catchment to Reduce Flood Risk

**31.** This aim is about managing the catchment to naturally collect, attenuate and retain rainwater to prevent flooding. This means making and finding space for rainwater to be managed locally across the catchment and where possible reused. The table below outlines some of the measures needed to manage flood risk within a catchment.

### Sustainable Flood Risk Management Measures

#### The Rural Catchment

- Effective Regulation of Reservoir Construction & Maintenance
- Effective Reservoir Inspection & Maintenance
- Sustainable Catchment Management (e.g. restore peat lands, re-forestation, etc)
- Sustainable Land Management
- Restore natural flood storage features (e.g. floodplains, river overspill areas, wetlands, etc)

#### The Urban Catchment (Towns & Cities)

- Sustainable Drainage Systems
- Manage excess surface water during extreme rainfall.
- Utilise green spaces / parkland for flood storage.
- Provide Separate Storm Drain/Sewer Systems.
- Rainwater Recycling & Re-use
- Integrated Urban Drainage Provision
- Rainwater Recycling & Re-use
- Education & Public Awareness<sup>5</sup>

## FRMD Policy 2A

### Effective regulation of reservoir construction and maintenance

- 32.** The preliminary flood risk assessment identified flooding from reservoirs as a potentially significant source of flood risk. There are currently 151 reservoirs in Northern Ireland, that are capable of holding 10,000 cubic metres or more of water, but no legislation for the regulation of reservoir safety, meaning maintenance decisions are at the discretion of the owners and operators. Given that there are around 66,000 people who currently live within reservoir inundation areas it has been decided to introduce legislation to ensure this risk is managed.
- 33.** DARD has worked with key stakeholders to develop policy proposals for a new legal and administration framework for regulating reservoir safety. The new regulatory regime will require reservoir owners to register their reservoirs and have appropriate inspection and maintenance arrangements in place.
- 34.** A Reservoirs Bill to implement these proposals was introduced in the NI Assembly in January 2014. More information on the proposals can be found at <http://www.dardni.gov.uk/riversagency/index/reservoirs-bill-ni.htm>. When in force, this legislation will provide assurance that the flood risk from reservoirs is being appropriately managed. Planning Policy can also contribute to reducing the risks associated with reservoir flooding (FRMD Policy 1A).

#### FRMD 2A Proposed Measures:

- Government will continue to develop the necessary legislation to provide assurance to the public that this risk is being appropriately managed.
- Planning policy will regulate development in proximity to reservoirs with an individual or combined capacity greater than 10000 cubic metres.

Silent Valley Reservoir is regularly inspected and maintained by NI Water.



## FRMD Policy 2B:

Manage rural land within catchments to reduce surface run-off and provide flood storage

35. The proposed policy is for rural land within river catchments to be sustainably managed to reduce surface water run-off and provide flood storage to reduce the risk of flood damage. Possible measures include:

- Reforestation – woodlands offer natural rainwater collection and attenuation which reduces run-off in low intensity rainfall events.
- Temporary Flood Storage – at strategic locations within the catchment river banks can be lowered allowing water to overflow onto adjacent land or land can be used for storing rainwater.
- Wetlands – low-lying land could be made into permanent flood storage. These can also be designed to treat agricultural wastewater and are known as integrated construction wetlands.

- Restoring Peatland - the photo below shows how dams can be installed in channels within peatland to retain water. This can reduce run-off, prevent pollution and protect these important habitats.

### FRMD 2B Proposed Measures:

- Publicly owned rural land across the catchment should be managed to reduce surface run-off and provide appropriate flood storage.
- Private owners of rural land should be encouraged to reduce run-off, provide flood storage and drain farmland to wetlands rather than rivers.
- Consideration should be given to the introduction of new wetlands and flood storage spaces.
- Rivers should be reconnected with natural floodplains where it can be demonstrated that this would reduce downstream flood risk.



## FRMD Policy 2C:

Manage urban areas to reduce surface water run-off and provide flood storage

**36.** In our towns and cities there is much less opportunity for rainwater to soak away naturally into the ground because of the amount of hard surfaces such as roofs, roads, footpaths and driveways. This results in large volumes of surface water during heavy rainfall which can put pressure on existing drains and sewers, and lead to flooding and pollution. While traditional drainage systems will continue to provide a useful contribution to flood risk management, the proposed policy is to: use SuDS measures

- to reduce surface water run-off and reduce loadings on existing drains;
- and provide storage for surface water to minimise damage to people and property when existing drains are overloaded during extreme rainfall.

**37.** For example, when removing grass from gardens to construct hard standing areas for parking cars, permeable paving can be installed. This will enable rainwater to soak away into the ground naturally and recharge groundwater. Public green spaces such as parkland, grassed areas and sports pitches may be utilised for managing rainwater through SuDS measures such as swales or attenuation tanks. Low-impact urban spaces (e.g. green spaces, car parks) could also be used to temporarily store flood water during extreme events. Consideration should also be given to utilising private green spaces such as gardens and golf courses, in partnership with landowners, where insufficient public space is available.

## FRMD 2C Proposed Measures:

- Where appropriate publicly funded drainage schemes should include SuDS.
- Public green spaces (e.g. parkland) and low impact areas (e.g. car parks) should be used to sustainably manage rainwater.
- The possibility of SuDS schemes should be considered in partnership with private owners of large green spaces to address local drainage needs.
- Private owners of large hard surface areas (e.g. shopping centre roofs, car parks) should be encouraged to sustainably manage rainwater on site.
- Develop and implement a strategy for retro-fitting SuDS measures such as rainwater recycling and green roofs into existing properties and the use of permeable surfaces should be encouraged.

## Consultation Question FRMD 1

FRMD policy 2C is about making space in our urban areas for sustainable drainage schemes (SuDS). It involves improved temporary flood storage and recognition that all rainwater should not be collected in underground pipes.

Do you support a policy of actively managing surface water and making provision for flood storage in our urban areas? Please outline your reasons or concerns.

## FRMD Policy 2D:

### Effective education & public awareness on sustainable drainage

- 38.** Public perception is that rainwater should not pond in urban areas but instead should be drained away in pipes. Before a policy of installing sustainable drainage and using 'low-impact' urban areas (e.g. green spaces, car parks) to store flood water can be rolled out, public buy-in will need to be secured. The proposed policy is to complete an effective education and public awareness campaign on sustainable drainage.

#### FRMD 2D Proposed Measures:

- Carry out public awareness and education campaigns to promote the benefits of sustainable drainage systems and flood storage in urban areas.
- Publicise the Strategic Flood map and provide information on flood risk to enable and support communities to be better prepared to face the risk (e.g. provision of sandbags).

## FRMD Policy 2E:

### Effective watercourse inspection & maintenance

- 39.** DARD is the statutory drainage authority in Northern Ireland and maintains over 6,800 kilometres of watercourses in both rural and urban locations - these watercourses are termed designated watercourses. It has a statutory role in maintaining the free flow of water within these channels, to minimise flood risk and to support land drainage. The policy is to continue funding an annual watercourse inspection and maintenance programme to help prevent flooding across the

catchment. Where a watercourse is not designated the responsibility for maintenance falls to the adjacent land owner known as the riparian owner. Government has powers to ensure the free flow of water is maintained.

- 40.** The focus of this approach should be reviewed to ensure that connection of rivers with their flood plains and the use of catchment flood risk management measures are promoted. This may involve changing the current approach to watercourse dredging, maintenance and inspection. Planning policy should also provide for easy access to watercourses for the purpose of inspection and maintenance.

#### FRMD 2E Proposed Measures:

- Government will continue to fund a programme of planned inspection and maintenance of designated watercourses. The work plan will be published annually.
- Government will continue to regulate undesignated watercourses and ensure owners of adjacent land carry out appropriate maintenance.
- Government will review the approach to watercourse maintenance to ensure that catchment flood risk management is supported.
- Government will amend planning policy to facilitate inspection and maintenance of watercourses.
- Government should develop and implement a prioritised programme of watercourse improvements and reconnection of rivers with flood plains to manage flood risk on a catchment basis.

# FRMD Aim 3:

## Provide Sustainable Integrated Drainage In Rural and Urban Areas

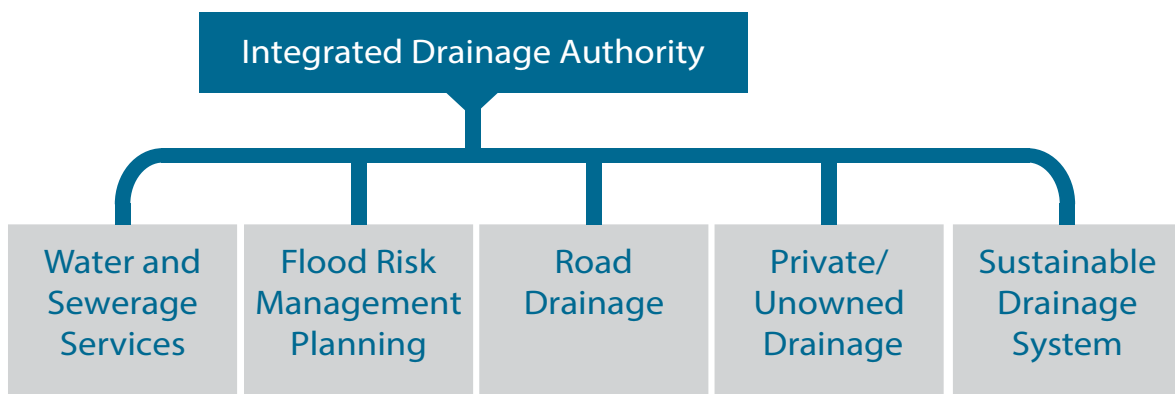
41. This aim is about taking a holistic, integrated approach to rural and urban drainage provision. This means ensuring that rivers, culverts, sewers, road drainage, and stormwater drainage are constructed and operated in an integrated manner to address flood risk. This will include addressing the policy, responsibility and funding gap of surface water drainage.

### FRMD Policy 3A:

#### Establish a strategic overview for flood risk management and integrated drainage

42. The work of many agencies and government departments impacts on flood risk management. No single organisation has responsibility for all

drainage in urban and rural areas. It is important that there is coordination. This could be addressed by making one organisation responsible for integrated drainage across a geographical area, as illustrated in the diagram below. This would include coordinating all drainage work, managing funding and directing the various drainage providers to carry out any necessary modelling and improvement work. This body could also consider ownership and maintenance issues as part of its regulatory role. It will be required to work closely with catchment stakeholders, drainage authorities and local councils. Bringing the drainage functions of the various government departments together and extending them to address flood risk challenges is one possible approach but it would require legislation and dedicated budgets. Other options could be to establish a coordinating forum or to promote the need for joint working amongst operational agencies along with enhanced resources.



**The authority would be responsible for:**

- Urban Drainage Funding
- Flood Risk Management Planning
- Integrated Drainage Planning/Modelling
- Planning Consultee
- Drainage Design Standards
- Managing Exceedance Flows
- SuDS Approval Body
- Strategy for private undesignated urban drainage



43. A key role for the overview body will be to develop a strategic infrastructure plan to manage flood risk across Northern Ireland and inform future investment decisions.

#### FRMD 3A Proposed Measures:

- Establish a Strategic Overview for flood risk to manage integrated drainage provision in urban and rural areas.
- Establish new organisational, funding and delivery arrangements for urban surface water drainage.
- Put in place clear SuDS approval, ownership and maintenance arrangements.
- Make the necessary legislative changes to give effect to these arrangements.
- Consolidate and utilise the asset information and models of existing drainage providers to develop integrated urban drainage models and plans.
- Develop a strategic infrastructure plan to manage flood risk across Northern Ireland and inform future investment decisions.
- Put 'shadow' arrangements in place to progress this policy (and mitigate the greatest flood risks) in the interim until appropriate legislation is put in place.

#### Consultation Question FRMD 2

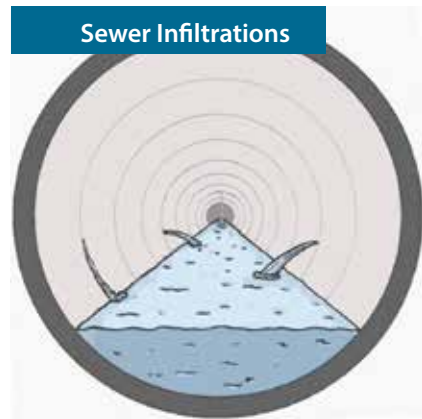
How do you think surface water management and drainage should be organised and funded? Do you think the drainage functions of government departments should be integrated into one drainage authority?

### FRMD Policy 3B:

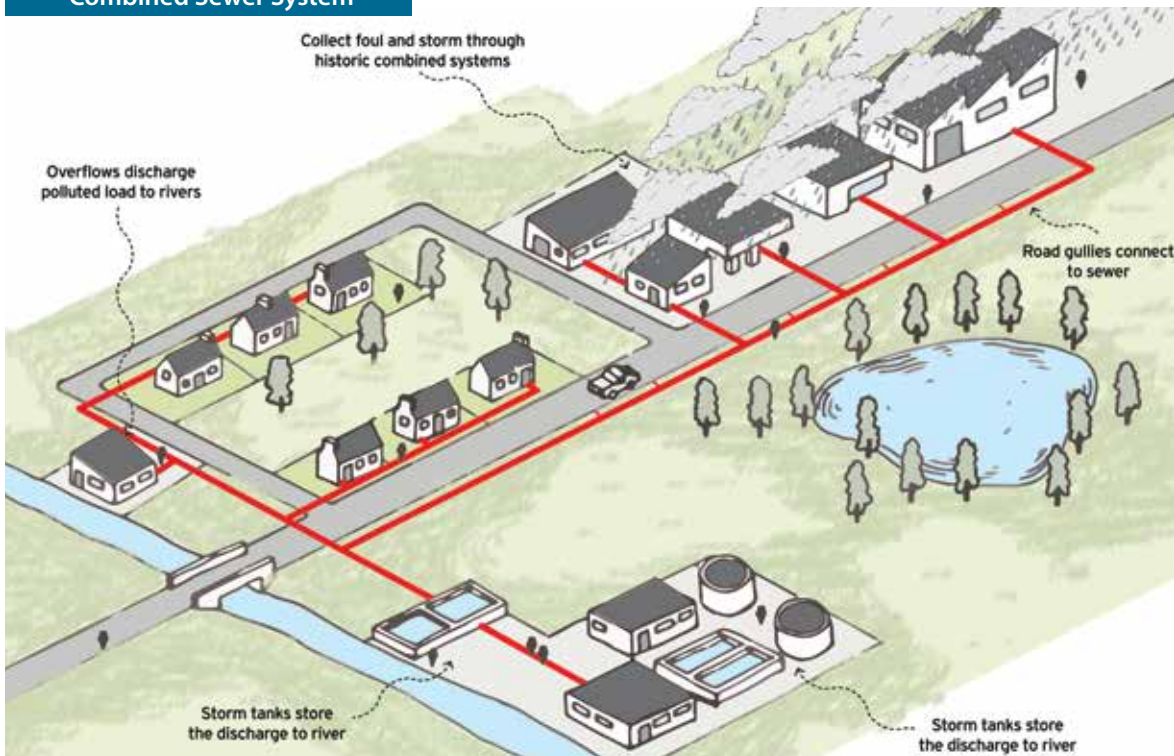
Reduce the amount of rainwater in combined sewers

- 44. Since the 1970's new developments have had to provide separate drainage systems for sewage and surface water. However due to the lack of a suitable river/drain to discharge the surface water, these systems are often merged at the site boundary and connected to an existing combined sewer.
- 45. Therefore in most urban areas sewage and rainwater are still collected together in combined sewers. This rainwater can overload the sewers causing flooding and pollution and costs £Millions every year to collect and treat. As previously mentioned, Combined Sewer Overflows protect the sewer system and connected properties from sewer flooding related damage. The diagram below illustrates a typical combined sewer system

- 46. Groundwater can also enter sewers through defects. This is known as infiltration and reduces the sewer capacity. Sewer infiltration and predicted increases in surface water due to climate change and development means that sewers will fail more often in the future. Traditional solutions such as underground storage tanks are often used but these tackle the symptoms and not the causes of flooding. Building bigger sewers is also not sustainable. It is expensive and during extreme weather the rivers, sewers and treatment works downstream will still be overwhelmed.



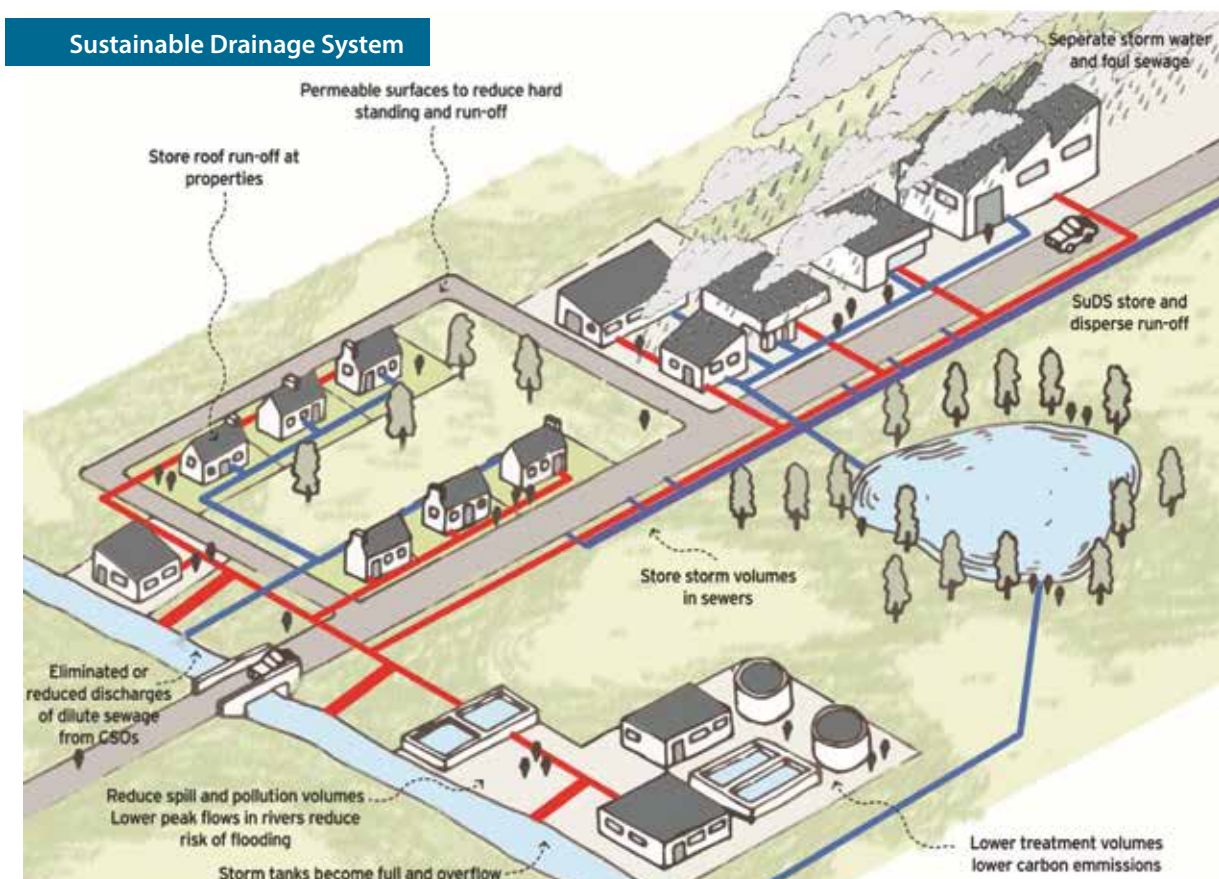
### Combined Sewer System



47. SuDS measures (FRMD Policy 2C) should be used to reduce surface water run-off, but this alone will not be enough, we also need to stop rainwater entering combined sewers. The long-term policy is to progressively reduce the amount of rainwater in the combined sewerage system by providing separate drains (to collect rain water from roads and other hard surfaces) and by reducing sewer infiltration. New storm connections to the combined sewer system should be avoided (FRMD Policies 1A & 1C). This is illustrated below.

#### FRMD 3B Proposed Measures:

- Implement a prioritised long-term programme to separate surface water drainage systems (recent development) from combined sewers.
- Implement a long-term programme of combined sewer separation to reduce flooding, pollution, wastewater costs and facilitate growth.
- Implement a long-term sewer maintenance programme to reduce ground water sewer infiltration where this is shown to be effective.



**FRMD Policy 3C:****Manage 'private' drainage systems to reduce the risk of flooding**

- 48.** Effective flood risk management requires all urban drainage systems to work together during extreme events. This means they need to be appropriately managed and maintained. However there are many drainage systems which are not currently owned or maintained by public drainage authorities. These include large private commercial developments, private sewerage systems, and private drains and private watercourses.
- 49.** The drainage systems on large commercial sites (e.g. shopping centres, industrial estates) and the Government Estate (e.g. schools, hospitals) should be well maintained. However information on these systems needs to be collected for inclusion in an integrated urban drainage model and to identify future opportunities for shared private-public drainage solutions. There are several private residential development sites where residents have been left with partially completed surface drains and sewers, after a Developer has gone out of business. The issue of unadopted roads and sewers was examined by a Committee for Regional Development Inquiry into Unadopted Roads in 2012<sup>12</sup>. The proposed policy is to collect information on the number and condition of unadopted sewerage systems (constructed since 2007) with a view to determining the costs of bringing these systems up to a suitable standard for adoption by NI Water.

- 50.** Over 170 km of private urban drains have been identified across Northern Ireland with little or no information available on the condition, structural integrity or level of blockages within these systems. The level of flood risk from these drains is therefore not clear. The proposed policy is to collect robust information on the location and condition of undesignated private urban drains, particularly in high flood risk areas. Priority should therefore be given to agreeing how this survey is to be managed and funded.
- 51.** Information on existing public and privately owned drainage systems should be used to inform development of the strategic infrastructure plan to manage future flood risk in Northern Ireland referred to in FRMD Policy 3A.

**FRMD 3C Proposed Measures:**

Collect information on:

- the drainage systems of large commercial sites and the Government Estate to identify opportunities for integrated private/public drainage solutions;
- unadopted residential sewerage systems (constructed since 2007) to determine the costs of upgrading these systems for future adoption;
- privately owned urban drains to identify opportunities to use these systems to sustainably manage future flood risk.

Use this information to help inform the strategic infrastructure plan in FRMD Policy 3A.

12 <http://www.niassembly.gov.uk/Assembly-Business/Committees/Regional-Development/Reports/>

# FRMD AIM 4:

## Improve Flood Resistance and Resilience in High Flood Risk Areas

**52.** Flood resistance and resilience is about putting structural measures such as flood barriers, and non-structural measures such as flood warning systems, in place to help reduce the impact of flooding when it occurs. The initial focus of flood resilience policies should be on the 69 flood risk areas identified through the Preliminary Flood Risk Assessment. These are the areas that are most likely to flood and cause the most impact on human health, the environment, cultural heritage and economic activity. The following paragraphs set out the policies that need to be taken forward to improve flood resilience in high flood risk areas.

### FRMD Policy 4A:

Develop and maintain accurate information on flood risk

**53.** It is essential that accurate information is provided on the location and levels of flood risk across NI. Existing flood risk information including the Strategic Flood Maps should therefore continue to be updated with information from new flooding events. This information should be made available to the public and shared within Government, to inform planning decisions and other government policies.

### FRMD 4A Proposed Measures:

- Continue to update information on the level of flood risk.
- Develop a central inventory of drainage assets, flood history and flood investment plans within government.

### FRMD Policy 4B:

Continue a flood defence & alleviation programme

**54.** Government provides a regular inspection and maintenance programme for existing flood and sea defences. Government also designs and constructs flood alleviation measures where these can be cost beneficial and significantly reduce the level of flood risk to a community. The proposed policy is to continue the annual inspection and maintenance programme of flood and sea defences and fund a prioritised programme of flood alleviation measures focused on protecting human health, the environment, cultural heritage<sup>13</sup> and economic activity.

### FRMD 4B Proposed Measures:

- Continue an annual flood and sea defence inspection and maintenance programme.
- Continue implementing a prioritised flood defence and alleviation investment programme to reduce the level of flood risk in high risk areas.

<sup>13</sup> Such as ancient monuments and world heritage sites.

**FRMD Policy 4C:**

Reduce the number of properties at risk of sewer flooding

55. Preventing sewer flooding inside properties has been identified as a priority by consumers in research carried out by the Consumer Council to inform NI Water's current business plan. This is understandable given the damage and distress caused by such flooding.
56. The proposed policy is for NI Water to continue to maintain a register of properties at risk of internal and external sewer flooding (due to sewer overloading) and continue with a prioritised investment programme to reduce the number of properties at risk of sewer flooding on this register. NI Water should also continue to educate the public on the importance of not flushing inappropriate items into sewerage systems as this reduces the likelihood of flooding and pollution incidents caused by blockages.

**FRMD 4C Proposed Measures:**

- Maintain a register of properties which have been subject to internal and/or external sewer flooding.
- Continue prioritised public sewer investment and maintenance programmes to reduce the amount of properties at risk of internal and/or external out-of-sewer flooding (eg from hydraulic under-capacity and blockages).
- continue to educate public on the importance of not flushing inappropriate items / substances into sewers

**FRMD Policy 4D:**

Deliver a programme of integrated surface water drainage schemes to alleviate localised flooding

57. No individual government organisation is currently responsible for all surface water flooding. While the three drainage agencies work together on a daily basis the need for more strategic collaborative working is evident. A proposed urban drainage organisation (FRMD Policy 3A) could be made responsible for surface water management and drainage in the longer-term. However, in the interim, a prioritised long-term programme of drainage schemes could be developed and commenced to reduce the number of properties at risk of localised surface water flooding. This would involve the existing drainage providers working together to develop and deliver joint solutions to surface water flooding problems.
58. The formation of the inter-departmental Flood Investment and Planning Group (FIPG)<sup>14</sup> provides a forum to progress local schemes to alleviate flooding and drainage related issues. The purpose of the FIPG is to provide a co-ordinated approach to the identification of localised flooding issues to be addressed on a multi-agency basis. This includes proposals for the investigation of flooding, and to propose potential solutions, agree responsibilities and make the case for investment. The FIPG will not focus on issues which are entirely the responsibility of one organisation but will consider developing an overview role to facilitate a government-wide view of flood alleviation investment in response to localised flooding issues.

14 The FIPG include membership from DRD, DARD and NI Water

**FRMD 4D Proposed Measures:**

- Develop a prioritised programme of local surface water drainage schemes through the Flood Investment and Planning Group (FIPG).
- Fund a prioritised multi-agency programme of integrated surface water drainage schemes to alleviate localised flooding issues.

**FRMD Policy 4E:****Promote the use of Individual Property Protection (IPP)**

**59.** There are many properties at risk of flooding in NI that will not benefit from publicly funded community flood defence systems in the foreseeable future. We are all responsible for protecting ourselves and our property from flooding. This means taking action to ensure we do all we can to help minimise flood damage to our land or property. Property owners can make permanent changes to reduce future flood damage. These measures are known as Individual Property Protection (IPP) and are focused on either keeping flood water out (flood resistance) or making the property easier to bring back to use after the flood water has receded (flood resilience).

**60.** In recent years the NI Executive has funded flood hardship payments of £1000 to households that are flooded during widespread events. This scheme has paid out around £4.5 million since it was first introduced in 2007. Rather than giving householders financial assistance to recover from the adverse affects of each incidence of flooding, the proposed policy is to be proactive and support those homeowners who are prepared to undertake modifications to protect their property from flooding. In

England, a recent Government backed IPP grant scheme provided over £5M and subsidised the installation of IPP measures in over 1100 properties. It is estimated that for every pound spent through the scheme, approximately £5 will be saved in the long term through flood damage avoided.

**61.** The proposed policy is that consideration be given to introducing an NI grant scheme to subsidise the installation of IPP in properties in NI, particularly in those areas that are unlikely to benefit from community flood defence systems. Building standards could also contribute to the introduction of IPP measures in areas of significant flood risk.

**FRMD 4E Proposed Measures:**

- IPP public awareness and education campaigns should be developed and targeted at residents living in high flood risk areas.
- Consideration should be given to introducing a NI grant scheme to subsidise the installation of IPP measures in properties, particularly in those areas that are unlikely to benefit from community flood defence systems.
- The review of Building standards (FRMD Policy 1A) could include consideration of the need for IPP in areas of significant flood risk.

## FRMD Policy 4F:

Ensure affordable flood insurance continues to be available to households and businesses

62. The 'Statement of Principles on Flooding and Insurance for the North of Ireland'<sup>15</sup> was signed by the NI Executive and the Association of British Insurers (ABI) in 2009. The Statement of Principles ensures that flood insurance remains as widely available as possible so that householders and small businesses continue to be able to protect themselves from the financial consequences of flooding. The UK Government recently announced that they have agreed the way forward with the ABI. Details are available on the DEFRA website.

### FRMD 4F Proposed Measures:

- The new flood insurance approach will be publicised when the enabling legislation comes into force.

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15 <https://www.abi.org.uk/~media/Files/Documents/Publications/Public/Migrated/Flooding/Statement%20of%20principles%20Northern%20Ireland.ashx>



# FRMD Aim 5:

## Be Prepared for Extreme Weather Events

**63.** This aim is about the public, the drainage agencies and the emergency services being prepared to respond quickly and effectively to a flooding event. The following paragraphs set out the new policies and actions that need to be taken forward to be prepared for an extreme weather event.

### FRMD Policy 5A:

#### Provide effective, efficient flood emergency Information & Communication systems

**64.** When people experience flooding, it is important that effective communication and information systems are available for members of the public to act, to request assistance (e.g. provision of sandbags), and report the flooding incident so that the appropriate drainage agency can carry out any necessary emergency or remedial action. It is also important to raise public awareness of the types of flooding and possible responses. For example, surface water flooding can require immediate local response.

**65.** The NI Executive's Flooding Incident Line (FIL) (0300 2000 100) provides this facility 24 hours a day, seven days a week. A number of websites including the NI Direct site and Belfast City Council's website also provide useful sources of information for the public on what to do in the event of flooding. However, the Executive's PEDU Review of the Government Response to the Belfast flooding events of 27-28 June 2012

showed that 80% of calls by the public to the FIL were abandoned during this critical period. The Review<sup>16</sup> makes a number of recommendations to improve the effectiveness of FIL and its supporting systems. In addition, research carried out by the Consumer Council has shown that only 7% of those interviewed would contact the FIL in the event of flooding to their property, and 46% said they did not know who to contact. The proposed policy is to publicise the FIL and the NI Direct website and complete the PEDU recommendations to improve the effectiveness of the FIL and its supporting communication and information systems.

#### FRMD 5A Proposed Measures:

- Publicise the Flooding Incident Line (FIL) and the information on flooding that is available through the NI Direct website.
- Complete the PEDU recommendations to improve the effectiveness of the FIL and its supporting communication and information systems.

<sup>16</sup> The Executive's PEDU Review can be viewed at <http://www.northernireland.gov.uk/pedu-report-on-flooding>.

**FRMD Policy 5B:****Put in place effective and reliable flood warning systems**

**66.** It is accepted that a flood warning system is required in Northern Ireland. An effective local flood response needs speedy action not only from the response agencies, but also the general public. Without an appropriate warning system it is unlikely that either can be put “on guard”. Flood warning systems cannot provide precise predictions of all localised flooding but would provide a helpful service to drainage authorities, councils and the public. The proposed policy is to introduce a flood warning system appropriate to the level of risk in NI.

**FRMD 5B Proposed Measures:**

- Continue work to introduce a flood warning system appropriate to the level of risk.

**FRMD Policy 5c:****Effective flood emergency planning and delivery structures**

**67.** Individual drainage providers concentrate on the performance of their own assets during major flooding events. This provides an essential contribution to reducing the impact of flooding and its escalation. However, the public’s perception of the service offered by government can be eroded as the flood event escalates. To improve the response to major flooding incidents, it is important that effective arrangements are in place to coordinate the work of the various Agencies involved.

This need was identified in both the Surface Water Flood Management Roles & Responsibilities Report published in 2011<sup>17</sup> and the Executive’s PEDU Report.

**68.** Effective emergency planning requires the input and advice of a range of bodies including emergency services, drainage authorities, health agencies, industry, and community organisations. For the Belfast area, Belfast Resilience brings together the relevant organisations to prepare emergency plans for dealing with incidents such as flooding. This provides an example of how emergency planning at a sub-regional level can contribute to improved coordination of plans between responding organisations and the wider community. The proposed policy is to support District Councils in their local emergency coordination role and ensure that effective sub-regional major incident plans are in place between all relevant organisations for all areas of Northern Ireland. This may involve the establishment of sub-regional multi-agency flood emergency planning teams. The response to flood events should take account of the local and immediate nature of surface water flooding in some areas. It may be helpful to enable local community self-help in high risk areas by establishing Community Flood Forums to encourage partnership between councils, drainage authorities and local communities.

17 [http://www.dardni.gov.uk/riversagency/index/ra-publications/ra\\_technical\\_documents.htm](http://www.dardni.gov.uk/riversagency/index/ra-publications/ra_technical_documents.htm)

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**FRMD 5c Proposed Measures:**

- Put in place sub-regional emergency planning structures and plans between all drainage providers, emergency services, the Flooding Incident Line, Councils and others to support coordinated local response to flooding.
- Continue to support local Community Flood Forums where appropriate.

**Consultation Question FRMD 3**

How could sub-regional emergency response planning and Community Flood Forums help to improve local planning and response to flooding emergencies?  
What other action could be taken?

# Glossary

<b>Adopted Sewer System</b>	A sewer system that is owned and maintained by NI Water.
<b>Annual Exceedance Probability (AEP)</b>	The likelihood of occurrence of a flood of given size or larger occurring in any one year.
<b>Attenuation Tanks</b>	Tanks that manage surface water by storing source water run-off and then release it slowly back into the local water course or drainage system in a controlled way.
<b>Biodiversity</b>	Is the variety of all living things.
<b>Catchment</b>	The area drained, either naturally or with artificial assistance, by a watercourse, including all drainage channels, tributaries, floodplains, estuaries and areas of water storage.
<b>Consumer Council</b>	The Consumer Council for Northern Ireland. CCNI represents the interests of water and sewerage customers to NIW and Government.
<b>Combined Sewer Overflow (CSO)</b>	Combined Sewer Overflows are overflows used in combined sewerage system to discharge storm waste water directly into surface waters to relieve hydraulic pressure in the system under storm conditions.
<b>Combined Sewer</b>	A sewerage system that collects both waste water and rain water.
<b>Culvert</b>	A network of pipes which carry our drainage system underground.
<b>DARD</b>	The Department of Agriculture and Rural development is the statutory drainage authority for Northern Ireland under the terms of the Drainage Order (NI) 1973. DARD is also the Competent Authority for the implementation of the EU Floods Directive.
<b>DEFRA</b>	Department for Environment Food and Rural Affairs. National Government Department, based in London.
<b>Designated Watercourse</b>	A watercourse that is designated by DARD so that they have powers to maintain the watercourse.
<b>Drainage System</b>	A system for draining water away from land. This includes road drains, surface drains, sewers, other pipes, culverts, and rivers. (See also sustainable drainage systems).

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<b>European Union</b>	The European Union (EU) is an economic and political union of 27 member states, located primarily in Europe. It was established by the Treaty of Maastricht on 1 November 1993 upon the foundations of the pre-existing European Economic Community.
<b>European Directive</b>	European Directives are laws which apply in European Union countries. Examples include: the Drinking Water Directive; the Urban Waste water Treatment Directive; the Water Framework Directive and others.
<b>Flood</b>	The temporary covering by water, from any source, of land not normally covered by water but does not include a flood solely from a sewerage system.
<b>Flood plain</b>	The generally flat areas adjacent to a watercourse or the sea where water flows in time of flood or would flow but for the presence of flood defences. The limits of a flood plain are defined by the peak water level of an appropriate return period event.
<b>Flood risk</b>	Flood risk is a measure of the impact of flooding and likelihood that it will occur.
<b>Flood Risk Management Plan (FRMP)</b>	Under the EU Floods Directive, Flood Risk Management Plans must be prepared at a river basin district level or a set of Plans co-ordinated at river basin district. The plans must include policies for managing flood risk in the long term taking account of the possible effects of climate change. DARD is the designated authority for the implementation of the Directive.
<b>NIEA</b>	The Northern Ireland Environment Agency.
<b>NI Water</b>	Northern Ireland Water.
<b>PEDU</b>	Performance Efficiency Delivery Unit.
<b>Preliminary flood risk assessment</b>	An assessment which identifies areas in Northern Ireland where flood risk is most significant.
<b>Private Drains</b>	A private drain is a pipe or channel owned by an individual, usually the property owner.
<b>RDS</b>	The Regional Development Strategy (RDS) sets out the Executive's broad plans for the future development and planning up to 2025.
<b>Significant flood risk</b>	Significant flood risk is determined by detailed analysis. <a href="#">Click here for a full explanation.</a>

<b>Significant Flood Risk Area</b>	Area identified as being at significant flood risk and subject to further mapping and consideration.
<b>Surface water flooding</b>	Surface water occurs as a result of high intensity rainfall which overwhelms natural or engineered drainage systems, resulting in water flowing overland and ponding in depressions in the ground.
<b>Sewerage system/ infrastructure</b>	A system of pipes and ducting which collects and transports sewage.
<b>Sustainable Drainage System (SuDS)</b>	A drainage system that controls the quantity and quality of run-off waters by providing storage in tanks or ponds. This delays or prevents discharge to streams or rivers until there is capacity to accommodate it.
<b>Unadopted sewer systems</b>	A sewer system that is privately owned.
<b>Undesignated watercourses</b>	A watercourse that is privately owned.
<b>Watercourse</b>	A stream, river, canal, ditch, drain, cut, culvert, dyke, sluice, valve, overland carrier or millrace. Water mains and sewers are not included in this definition.
<b>Water Framework Directive</b>	The European Water Framework Directive is a wide-ranging piece of legislation covering all water bodies including rivers, lakes, estuaries, coastal waters and ground waters. It was established in law in Northern Ireland in 2003 through the Water Environment (WFD) Regulations (Northern Ireland) (SR 2003 No. 544).



## **Water Policy and Shareholder Division**

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Department for Regional  
Development  
Room 1-22  
Clarence Court  
Belfast BT2 8GB