Sustainable Water

A Long-Term Water Strategy for Northern Ireland

(2015 – 2040)

Department for Regional Development
www.drdni.gov.uk

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Ministerial Foreword

I am very pleased to publish Sustainable Water – A Long-Term Water Strategy for Northern Ireland (2015-2040). This Strategy sets out a range of initiatives to deliver the Executive's long-term goal of a sustainable water sector in Northern Ireland.

I know the importance of the water sector from my experience in local government and from serving my constituency. Water is essential to life, but it can also cause widespread damage if it is not managed properly. I also understand that responsibilities for the water sector are spread across a number of government departments and therefore this Strategy seeks to deliver a more joined up approach.

It is important to look at every part of the water cycle from rainfall to drainage and treatment of wastewater, as well as the supply and treatment of drinking water. The Strategy provides an over-arching approach for the whole of the water sector in managing all our water needs. I am passionate about ensuring that we have a sustainable water sector which supports the Regional Development Strategy 2035 to promote economic growth and which also ensures that we do all that we can to protect the environment and reduce the risk of flooding throughout Northern Ireland.

We also need to effectively manage the water in our rivers, lakes and loughs which we use for drinking, cooking, washing, farming and manufacturing. We, in Northern Ireland, continue to benefit from high quality drinking water and effective treatment of wastewater. This is largely due to significant investment by Northern Ireland Water.

This natural resource is precious and we often take it for granted and are oblivious to both the cost of water and the impact its misuse has on our environment. It is important that we all play our part to protect our environment by using water more wisely in our homes and businesses to reduce the pressures we put on this valuable, natural resource.

The Strategy sets out ways in which we can reduce the amount of energy needed to move and treat both drinking water and wastewater. It also encourages cross-departmental working to develop the water and sewerage industry, to meet our environmental commitments by improving the quality of our inland and coastal waters and reducing pollution, to be affordable in the current economic climate and to deliver reliable high quality services to the public.

In my role as Minister for Regional Development, I am committed to working with all stakeholders in the delivery of this Strategy for the benefit of everyone in Northern Ireland.

Michelle McIlveen

Michelle McIlveen MLA
Minister for Regional Development

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Part 1 |
Executive Summary

Setting the Scene

Introduction

1.1 The purpose of this document is to set out the Northern Ireland Executive's proposed Long-Term Water Strategy (LTWS) for 2015-40. The Strategy presents a clear framework for action which will facilitate implementation of a range of initiatives aimed at delivering the long-term vision to have a sustainable water sector in Northern Ireland. To achieve this vision, the Strategy encourages a sustainable and integrated approach to managing all our different water needs in a way which promotes regional development, without compromising the environment or increasing flood risk.

1.2 Water is our world's most precious asset. It covers two thirds of the earth's surface while up to 75% of the human body is made up of it. Water is one of the prime elements necessary for life. Water circulates through the land just as it does the human body, transporting, dissolving and replenishing nutrients and organic matter, while carrying away waste material. In the body, water regulates the activities of fluids, blood and organs. Life as we know it revolves around access to good quality water.

1.3 Without water, life would cease to exist. Yet most of us take water for granted. We turn on our taps and expect water to flow, without giving a second thought to how it has been abstracted, pumped, treated and distributed. Similarly, we flush the toilet or empty our sinks and expect the wastewater to disappear. We do not often make the connection between the water we use in our daily lives and the impact this has on water in the wider environment. The only time we tend to take notice is when problems occur, such as water supply interruptions, blocked sewers or flooding.

1.4 So where does our water come from? Water that flows into our homes and businesses comes from reservoirs, rivers, lakes and from water stored in rocks (aquifers) below the earth's surface.

1.5 The Strategy focuses on sustainably managing the water in our rivers, lakes, loughs and aquifers which we use for drinking, cooking, washing, farming and manufacturing. The Strategy includes proposals to help us use water more efficiently in our homes and businesses so we take less from our natural environment. It proposes how we can sustainably manage excess rainwater locally to reduce the impact of flooding on our communities. It also examines ways in which we can reduce the amount of energy needed to move and treat drinking water and wastewater. To deliver these proposals, the Strategy seeks to develop cross-departmental working and stakeholder partnerships within the water sector to ensure we meet our environmental obligations in an affordable manner, whilst continuing to meet the water and sewerage needs of households, agriculture and industry.

Delivering the European Commission's Blueprint for Water

1.6 Northern Ireland must meet the requirements of European Directives. A number of these Directives are designed to protect and improve the quality of the water environment such as the Water Framework, Urban Waste Water Treatment, Bathing Waters, Groundwater, Floods and Drinking Water Directives. The Strategy focuses on complying with these Directives and meeting the aims of the European Commission's 2012 Blueprint[1] to Safeguard Europe's Water Resources. The Blueprint emphasises key themes which include: improving land use, addressing water pollution, increasing water efficiency and resilience, and improving governance by those involved in managing water resources. The long-term aim of the Blueprint is to ensure the sustainability of all activities that impact on water, thereby securing the availability of good quality water for sustainable and equitable use.

Sustainable Catchment Management

1.7 In line with the Blueprint proposals, the Strategy focuses on managing all the water-related activities across the catchments of our rivers, lakes, loughs and aquifers to protect and improve the quality of water, as well as enhancing landscape and biodiversity. The introduction of a risk-based approach to managing drinking water quality through raw water monitoring will enable potential contaminants to be addressed at source through catchment management solutions, rather than traditional high energy treatment. Preventing substances entering our natural water system is often a more cost-effective and energy efficient way of tackling water quality issues. This is the concept behind sustainable catchment management, which is a key theme of the Strategy. This is illustrated in Figure 1.1 (on the next page). The left hand side of the diagram shows how traditional land management, planning and drainage can impact on water quality and increase flood risk. The right-hand side shows how sustainable catchment management can help protect and improve water quality and help manage flood risk.

1 http://ec.europa.eu/environment/water/blueprint/index_en.htm

Figure 1.1

Traditional Catchment

1. Damaged Peatlands:

Exposed peat cannot regulate water flow, and environmentally poor run-off can enter river systems. Can also release significant quantities of carbon.

2. Septic Tanks:

Discharge from septic tanks can contain substances that are potentially harmful to human health and the environment. A lack of proper maintenance can exacerbate pollution to the environment and groundwater supplies.

3. Over Grazing:

Overgrazing strips away vegetation, reducing the ability of the land to act as a natural drainage system. Surface water run-off can increase thereby exacerbating the risk of flooding.

Topsoil and nutrients washing into rivers and waterways can have a detrimental effect on animal and plant life.

4. Uncovered Silage Pits:

Nutrients (phosphates, nitrates, etc) can leech from poorly constructed and

8. Restored Peatlands:

Acts as a natural water filtration system, slowing run-off and removing pollutants. Can store significant quantities of carbon reducing the impact of climate change.

9. Restored Floodplains:

Restoring floodplains recreates the natural functions of the landscape, including temporary storage of floodwaters, moderation of water flows and quality, groundwater recharge and prevention of erosion. Restored floodplains also provide habitat for wildlife, promote biodiversity and create recreational opportunities.

10. Farms Draining into Wetlands:

Many wetlands have been drained, badly managed or neglected. This threatens the species that inhabit wetland ecosystems. Draining farms into wetlands can restore the natural habitat for wildlife and plants and reduce diffuse pollution.

11. Greywater Systems:

Greywater is water that has already been used in washing machines, showers, baths, and sinks. It is not suitable for drinking but can be re-used to flush toilets.

12. SuDS Schemes:

Sustainable Drainage Systems (SuDS) help protect watercourses and groundwater from pollution by treating surface water runoff in a more sustainable and natural manner. These systems can help maintain natural river flows by the slow release of water. They can also protect areas further downstream from flooding, as runoff is managed at source and slowed down through attenuation and storage.

13. Storm Separation:

Provides separate sewers and drains for wastewater and surface water.

14. Groundwater:

Groundwater is water found underground in cracks and spaces in soil, sand and rock. It is a vital asset to the health of rivers and lakes.

maintained silage pits and affect the quality of nearby streams and rivers.

5. Developments on Flood Plains:

Developing within floodplains not only creates a high level of flood risk for the new development but also increases flood risk elsewhere as the floodplain's natural ability to store flood water is reduced.

6. Pesticides Entering Rivers:

Diffuse pollution is caused by fertilisers, pesticides, chemicals and nutrients seeping or being washed from the land into rivers, lakes and groundwater. These pollutants not only have a detrimental impact on aquatic plant and animal life but also affect the quality of raw water being abstracted for drinking water purposes.

7. CSOs:

Combined Sewer Overflows (CSOs) come into operation and discharge wastewater directly into the environment when sewers are overloaded during intense rainfall. CSO discharges can contain a wide variety of pollutants, including bacteria and chemicals which can seriously compromise the quality of receiving waters.

At the top of the catchment, we can see how protecting the peat bogs can prevent organic matter being washed into the river. Further down the catchment, we can see how separate storm sewers and sustainable drainage systems can reduce sewage spills and flooding. The key to this approach is good communication across the sector and working together on joint solutions.

Funding of Water and Sewerage Services

1.8 The Northern Ireland Executive has given a commitment that additional household water and sewerage charges will not be introduced during its current Programme for Government (2010-16). Charges for non-domestic customers such as agriculture, business and industry are already in place.

Financial Investment

1.9 The scope of this Strategy is far reaching and full implementation of the proposed actions in the Strategy may require significant financial investment over its 25-year lifespan. The issue of costs and funding is particularly important in the current economic climate and, at the time of writing, it is envisaged that reductions in funding may have an impact on key stakeholders' (government departments and NI Water) ability to deliver some of the objectives of the Long-Term Water Strategy, at least in the short-term.

Not implementing the Strategy will, however, bring its own longer - term problems for the water sector, the environment and for economic development. It is, therefore, essential that the Strategy Implementation Action Plan sets short, medium and long-term priorities in order to maximise benefits from public expenditure funding as and when it becomes available.

This cross-Departmental Strategy will help to ensure available capacity in our water and sewerage network to facilitate economic development and growth. It will also help to achieve environmental improvement and compliance therefore minimising the risk of infraction from the European Commission.

The Strategy also seeks to reduce the cost of providing water and sewerage services by promoting and encouraging more sustainable treatment solutions.

Delivering in Partnership

1.10 Development of the Strategy was led by the Department for Regional Development (DRD) which has responsibility for the policy and funding for water and sewerage services, with input from other departments with responsibility for key water policy areas including:

- the Department of Agriculture and Rural Development (DARD) which is responsible for flood risk management, drainage and agriculture; and
- the Department of the Environment (DOE) which is responsible for environmental policy and regulation, as well as preparing strategic planning policy and guidance.

In England and Wales, all aspects of water policy are dealt with by one department[2]. Responsibility for water policy in Northern Ireland is currently split across various departments (DRD/DARD/DOE/DCAL). From May 2016, the water responsibilities of DRD, Waterways Ireland responsibilities from DCAL[3] and flood risk management and drainage responsibilities of DARD will sit under the new Department of Infrastructure. Agriculture, environmental policy and regulation will sit under the new Department of Agriculture, Environment and Rural Affairs. However, there will still be a need for all those functions that have an impact on, or interest in, the management of water in our environment to work together. To address this challenge, the Strategy encourages cross-departmental and partnership working to deliver many of the policies.

2 The Department for Environment, Food and Rural Affairs (DEFRA)

3 Department of Culture, Arts and Leisure

Key Strategy Principles and Aims

What will the Strategy achieve?

1.11 The Long-Term Water Strategy will:

- Create a more sustainable water sector where all water related activities can co-exist without compromising the environment or increasing flood risk.
- Consolidate and bring together all policies that affect the water sector.
- Progress delivery of difficult cross-cutting policies such as water efficiency, surface water management and water and sewerage funding and regulation.
- Inform the development and delivery of the Executive's River Basin Management Plans, Flood Risk Management Plans and proposed Marine Plan.
- Provide strategic direction and a framework for long-term investment plans to encourage the delivery of sustainable initiatives with longer pay back periods.
- Ensure existing water and sewerage infrastructure and investment proposals inform future planning decisions.

1.12 To help achieve our vision for a sustainable water sector, the Strategy will focus on five key principles:

Key Principles

Principle 1 – Economic Development and Growth

1.13 Growing the economy is one of the Northern Ireland Executive's main priorities. To support economic growth we need modern and sustainable infrastructure. We must, therefore, ensure that adequate investment is made in our water, sewerage and drainage infrastructure to facilitate new industrial and residential development, promote tourism and attract inward investment to Northern Ireland.

Principle 2 – Affordability

1.14 While NI Water has successfully reduced its costs since 2007, annual operational costs for 2013/14 were still nearly 12.6% higher than an average water company in England and Wales. Very simplistically, this means that for every £1 spent by an average water company in England and Wales, NI Water spends £1.14. Various local factors, including NI Water's large operating area, length of network, smaller customer base and current governance and funding arrangements contribute to this difference in costs. However, there is no doubt that, with further investment, NI Water's service delivery costs could be reduced further to close the gap with similar companies in the UK.

Principle 3 – Environmental Improvement and Compliance

1.15 Major investment in water and sewerage infrastructure and in agriculture over the last decade has resulted in significant improvements in the quality of drinking water and of our inland and coastal waters. As wastewater treatment continues to improve through investment, priority now needs to be given to reducing the risks of pollution from sewage discharges. Success in reducing these risks is becoming increasingly important in meeting environmental quality obligations under the various European Directives.

Principle 4 – Flood Risk Management

1.16 There have been a number of flood events in Northern Ireland in recent years which have demonstrated the potential widespread impact of flooding and our vulnerability to this risk. The impact of flooding on individual households, communities and businesses can be devastating. Extreme weather resulting in flooding of properties and infrastructure is expected to be a significant long-term risk associated with climate change for Northern Ireland[4]. It is important to recognise that eliminating all flooding is not a realistic objective. However, this should not prevent action being taken. It is essential that flood risk is sustainably managed to facilitate social, economic and environmental development.

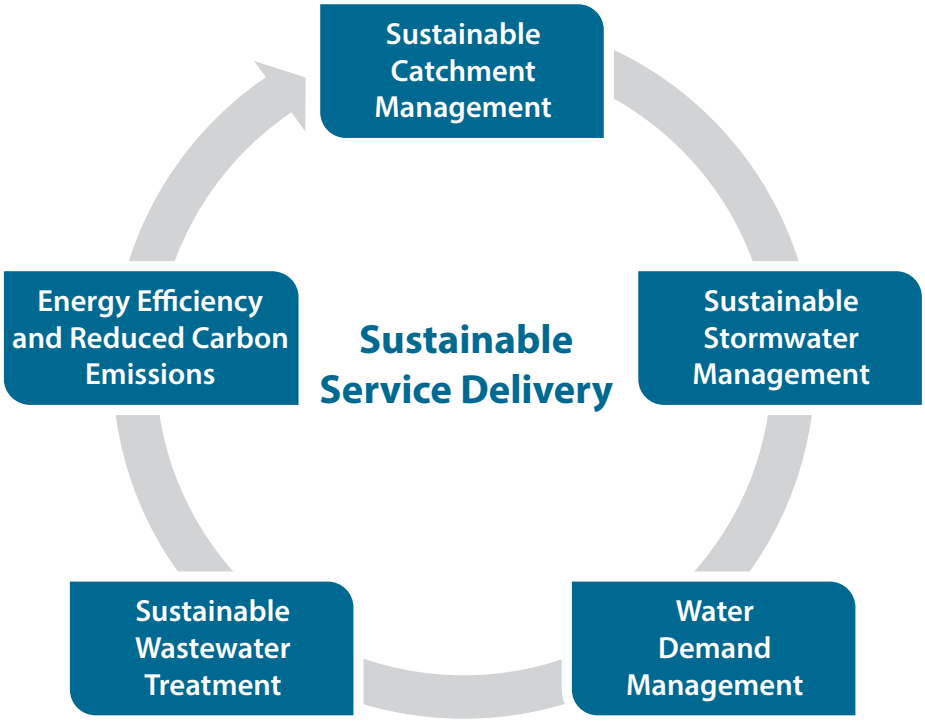
Principle 5 – Sustainable Service Delivery

1.17 Pumping and treating water and sewage is extremely energy intensive. It is, therefore, no surprise that NI Water is the largest single electricity consumer in Northern Ireland. Despite the recent drop in energy prices, it is likely that energy prices will increase which could see annual power costs rise to around £43m by 2020. This does not factor in growth or future improvements in infrastructure needed for European compliance, both of which will see energy costs rise even further.

1.18 To manage future power costs and carbon emissions, NI Water will need to deliver 'greener' services. This means continuing to maintain and upgrade assets and infrastructure to improve services and protect the environment. However, this must be done without creating a legacy of costly high energy assets to be paid for by future customers. Future water and sewerage investment in maintenance, quality, service levels or growth must be sustainable. This means moving away from conventional high energy water, wastewater and drainage solutions and adopting innovative, natural approaches where issues are addressed at source. Figure 1.2 outlines the approach to sustainable service delivery and the five key policies that are needed.

4 http://randd.defra.gov.uk/Default.aspx?Mod%ADule=More&Location=None&ProjectID=15747

Figure 1.2 Sustainable Service Delivery



1.19 *Sustainable Catchment Management* - achieving improvements in raw water quality (and drinking water quality) by managing diffuse pollution within an integrated catchment plan, rather than through energy-intensive treatment processes to deliver progressively marginal reductions in pollution from discharges of wastewater. Sustainable catchment management should achieve a healthy, resilient and valued water source that supports businesses and communities.

1.20 *Sustainable Stormwater Management* - managing rainwater locally through land management, urban design, the use of Sustainable Drainage Systems (SuDS), stormwater separation and sewer infiltration reduction rather than providing progressively larger sewerage systems.

1.21 *Water Demand Management* - reducing leakage and introducing demand management measures that reduce waste, rather than by increasing water abstraction, treatment and transfer – all with an associated energy demand.

1.22 *Sustainable Wastewater Treatment Solutions* - gradually transforming the wastewater infrastructure and asset base so that it costs significantly less to operate and maintain, while simultaneously enhancing compliance and providing for growth.

1.23 *Energy Efficiency and Reduced Greenhouse Gas Emissions* - managing and maintaining existing water and sewerage assets to improve energy efficiency and minimise emissions. With energy costs set to increase in the future, NI Water needs to review its current processes and systems to identify how energy efficiency savings might be achieved through innovative management and procurement of its assets and infrastructure.
It will also be important that NI Water continues to increase the amount of energy it secures from renewable sources such as wind, solar, hydro and anaerobic digestion.

Key Strategic Aims

1.24 Following detailed stakeholder engagement and consumer research, four high-level aims have been developed to cover the key water needs within a catchment:

- Provide high quality sustainable supplies of drinking water to households, industry and agriculture;
- Manage flood risk and drainage in a sustainable manner;
- Achieve the environmental requirements of the Water Framework Directive in a sustainable manner; and
- Provide sustainable water and sewerage services that meet customers' needs.

1.25 The Strategy will help to deliver specific commitments in the Northern Ireland Executive's Programme for Government, as well as its European commitments. The Strategy will also inform future Social and Environmental Guidance for water and sewerage services which sets out key investment priorities for the water industry.

Strategy Structure

1.26 The Strategy is structured as follows:-:

Part 1 - Executive Summary

Part 2 - Drinking Water Supply and Demand

Part 3 - Flood Risk Management and Drainage

Part 4 - Environmental Protection and Improvement

Part 5 - Water and Sewerage Services

1.27 An overview of Parts 2-5 of the Strategy is outlined overleaf.

Overview of Parts 2-5

Part 2 – Drinking Water Supply and Demand

1.28 There are many challenges in providing safe, sufficient supplies of drinking water. These challenges include funding, drinking water quality compliance, security of supply, carbon emissions, environmental protection, climate change and resilience.

1.29 Meeting these challenges requires a sustainable approach to drinking water supply and treatment from the catchment to consumers' taps. Our long-term vision is '**to provide high quality, sustainable supplies of drinking water to households, industry and agriculture**'.

1.30 Our strategy for achieving this vision is structured around three key aims delivered through a number of policies. These are set out below.

DW Aim 1

Manage drinking water quality risks in a sustainable manner from source to tap.

DW Aim 2

Meet the water demand needs of society, the economy, and the environment.

DW Aim 3

Resource efficient drinking water treatment and supply chains.

Part 3 – Flood Risk Management and Drainage

1.31 There are a number of issues to consider in managing flood risk and drainage. These include development and growth, climate change, environmental protection and improvement, poor land management practices, funding and effective surface water management. Our long-term vision is to '***manage flood risk and drainage in a sustainable manner***.' Our strategy for achieving this vision is structured around five key aims delivered through a number of policies. These are set out below.

FRMD Aim 1

Deliver sustainable flood resilient development.

FRMD Aim 2

Manage the catchment to reduce flood risk .

FRMD Aim 3

Provide sustainable integrated drainage in rural and urban areas.

FRMD Aim 4

Improve flood resistance and resilience in high flood risk areas.

FRMD Aim 5

Be prepared for extreme weather events.

Part 4 – Environmental Protection and Improvement

1.32 Protecting and improving the longer term quality of the water environment is fundamental to securing high quality, safe drinking water supplies for households, industry and agriculture. A healthy water environment is critical. It is not just needed for drinking water but also supports recreational activities, biodiversity and the character of our countryside.

1.33 We need to manage the land within the catchments of our rivers, lakes, loughs and aquifers to protect and improve the quality and levels of water in the environment from source through to the sea. Our long-term vision is to '**meet the environmental requirements of the Water Framework Directive in a sustainable manner**'. Our strategy for achieving this vision is structured around five key aims delivered through a number of policies. These are set out below.

EP Aim 1

Sustainable environmental policy and regulation.

EP Aim 2

Sustainably manage the catchment to reduce diffuse pollution.

EP Aim 3

Effective and efficient wastewater collection and treatment.

EP Aim 4

Maintain sustainable levels of water in the environment.

EP Aim 5

Improve river and coastal water morphology and biodiversity.

Part 5 – Water and Sewerage Services

1.34 The supply of clean, healthy drinking water and the effective treatment of our wastewater are essential for public health, the economy and the environment. These services must meet the varied needs of all customers including agriculture, business, industry and households without impacting on the environment.

1.35 Delivering clean safe drinking water to over 825,000 households and businesses currently requires around 560 million litres per day of water to be abstracted, treated and distributed through a supply chain of 23 impounding reservoirs, 24 water treatment works, 370 service reservoirs, over 350 water pumping stations and over 26,700 km of water mains. This must then be returned to the environment through 15,400 km of sewer mains using over 1,400 sewage pumping stations to 1,030 wastewater treatment works and 60 sludge management centres.

1.36 Our water and sewerage services cost around £370 million each year[5] yet it is still a common perception that water should be free because it falls from the sky and that there is no need to conserve water because we have so much rain. This ignores the fact that it takes a lot of electricity and chemicals to produce high quality drinking water. Only 4% of treated water is consumed. The majority is used for other purposes (toilets and showers). If we reduce the amount of water we use, our carbon footprint will be smaller, less damage will be caused to the environment through the use of chemicals and treatment and electricity costs will be reduced.

5 As identified in PC15 revenue requirement

1.37 The long-term vision is to provide '**sustainable water and sewerage services that meet customers' needs**.' The vision ensures that the three pillars of sustainability (economic development, social development and environmental protection) are considered as well as affordability. Our strategy for achieving this vision is structured around five key aims delivered through a number of policies. These are set out below.

WSS Aim 1
Provide efficient and affordable water and sewerage services.

WSS Aim 2
Provide high quality services to water and sewerage customers.

WSS Aim 3
Provide high quality customer service and customer information.

WSS Aim 4
Provide resilient and secure water and sewerage services.

WSS Aim 5
Utilise NI Water assets to provide wider benefits for the environment and the community.

Implementation, Monitoring and Review

Implementation

1.38 The Strategy includes 18 aims and 68 individual policies, each with a number of measures for delivery. These measures will be set out in a Strategy Implementation Action Plan. The Plan will assign responsibility for each individual measure and include agreed timescales for completion and delivery. It is expected that an Implementation Action Plan will be published to help deliver the Strategy. An inter-departmental Water Strategy Implementation Board will oversee implementation of the Long-Term Water Strategy.

Monitoring

1.39 Monitoring delivery of the measures will be the responsibility of the Department for Regional Development (DRD) (or its successor) which will report progress to the Water Strategy Implementation Board and the Northern Ireland Executive.

Review

1.40 If the Strategy is to remain relevant, through time it will be necessary to review and update policy measures and initiatives. Formal reviews will be carried out every six years to align with the timeframes of future water industry investment periods, River Basin Management Plans and Flood Risk Management Plans. In addition to this, informal three year reviews will also be undertaken. These reviews will take into account:

- Changes in government policy.
- Future funding availability.
- Rate of implementation of the Strategy; and
- The effectiveness of policies that have been delivered.

Part 2 |
Drinking Water Supply and Demand

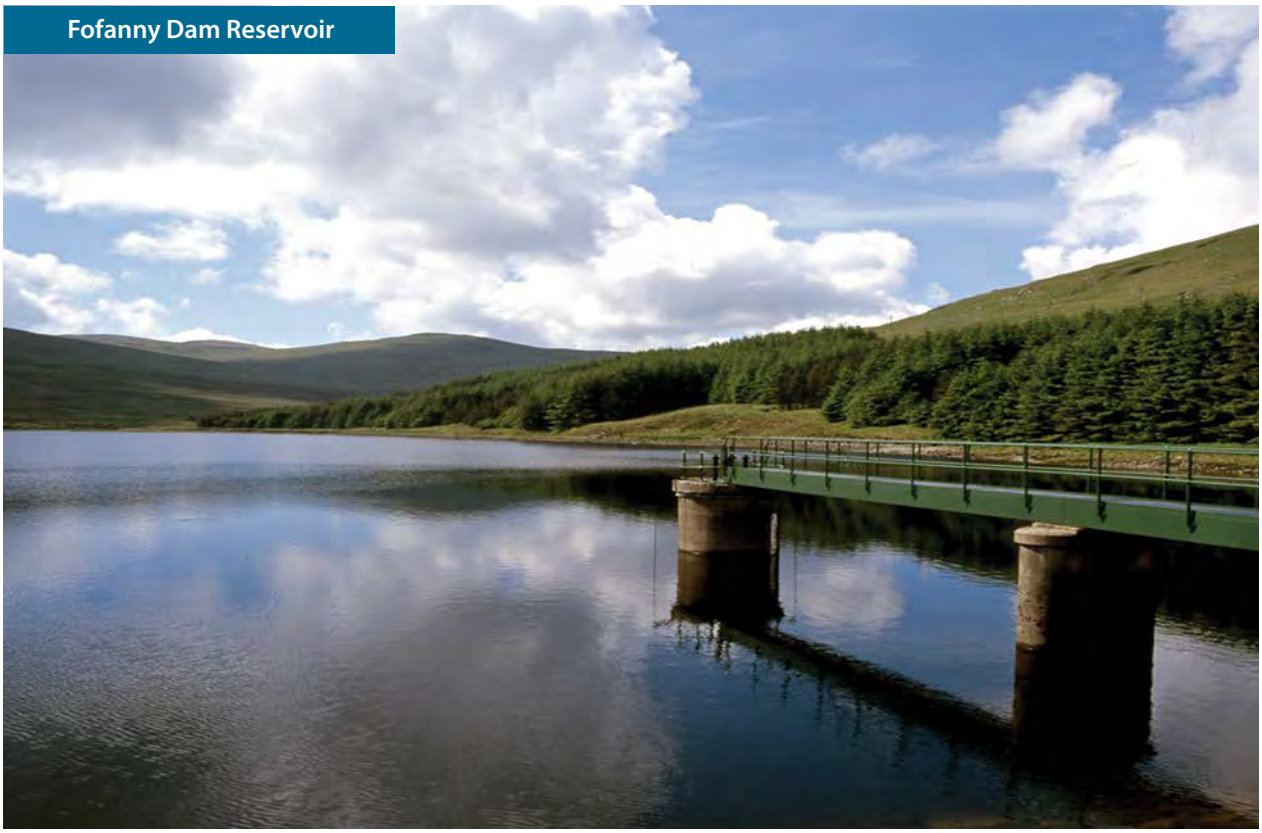
Setting the Scene

Introduction

2.1 Water is fundamental to life. Safe water supplies are essential to public health, to the development of clean towns and cities, to the economy and to the industrial and agricultural sectors. However, the water we need must be abstracted, treated to a high standard and distributed to our homes and places of work. This has an impact on the local environment where water is abstracted and in the quantities of carbon, chemicals and finance necessary to deliver the service. There is more we all can do to secure an adequate supply of high quality water, while reducing our overall impact on the environment.

2.2 Our inland waters are not only an invaluable source for drinking water but are also an important habitat for a host of aquatic plant and animal life and provide a valuable amenity for recreation and tourism. Extensive abstraction for human use as drinking water, for the irrigation of farm land and for industrial purposes, can place natural ecosystems at risk.

Fofanny Dam Reservoir



2.3 It is also predicted that there will be pressure on water resources in future as a result of changing climatic conditions, which is likely to result in more frequent extreme weather events, such as freeze-thaws and periods of drought. In this chapter, we will consider how best to deliver safe, secure, sustainable drinking water to households, industry and agriculture, now and in the future. Our overall strategy for drinking water can be summarised as follows:

- Work with NI Water, the public and the industrial and agricultural sectors to use water more wisely.
- Develop long-term plans to secure future water resources, taking account of drinking water demands and the impact of climate change.
- Continue to maintain and review Drinking Water Safety Plans to assess risks to drinking water quality and drive further improvements for both public and private water supplies.
- Build in contamination risk resilience in the water supply chain from the source through to consumers' taps.
- Actively manage the land around drinking water sources (known as catchments) to secure water quality and reduce the need for treatment.
- Invest in treatment works to meet drinking water quality standards and maintain the high level of treated water already achieved.
- Continue a programme of water mains rehabilitation to target localised issues such as colour, taste and odour and deliver an improvement in overall water quality.
- Consider the implementation of a lead strategy to target the risks of lead pipes and comply with the EU lead drinking water standard.
- Work to increase the energy efficiency of drinking water treatment and supply systems and explore opportunities to generate renewable energy from drinking water infrastructure and assets.

Public Drinking Water Supplies

Background

2.4 Northern Ireland Water (NI Water) is the statutory water undertaker for Northern Ireland supplying water to over 99% of the Northern Ireland population. The remainder of the population is served by private supplies. NI Water's operating area is mostly rural and as a result the average length of water main and sewer per household in Northern Ireland is twice that of an average UK company. This requires water and sewage to be pumped long distances. There are 26,700 km of water main and 15,400 km of sewer main. Pumping and treating water and sewage is extremely energy intensive. NI Water is our largest single electricity consumer with energy and UK Carbon Reduction Commitment Scheme costs amounting to energy bills of over £32m per year. Despite the recent drop in energy prices, it is anticipated that these will rise over time to a total of around £43m per year by 2020.

Drinking Water Quality

2.5 The Drinking Water Directive[6] sets standards (or parameters) for the most common substances that can be found in drinking water. The aim of the Directive is to protect the health of consumers by ensuring drinking water is wholesome and clean.

6 Council Directive 98/83/EC

Over 100,000 tests are carried out each year to monitor the quality of drinking water across NI Water's supply system for a range of microbiological and chemical parameters. Drinking Water Inspectorate (DWI) regulates and assesses compliance with the regulatory requirements to ensure safe, clean drinking water supplies. The results are summarised in its Annual Drinking Water Quality Reports which can be viewed at https://www.doeni.gov.uk/topics/water/drinking-water-quality

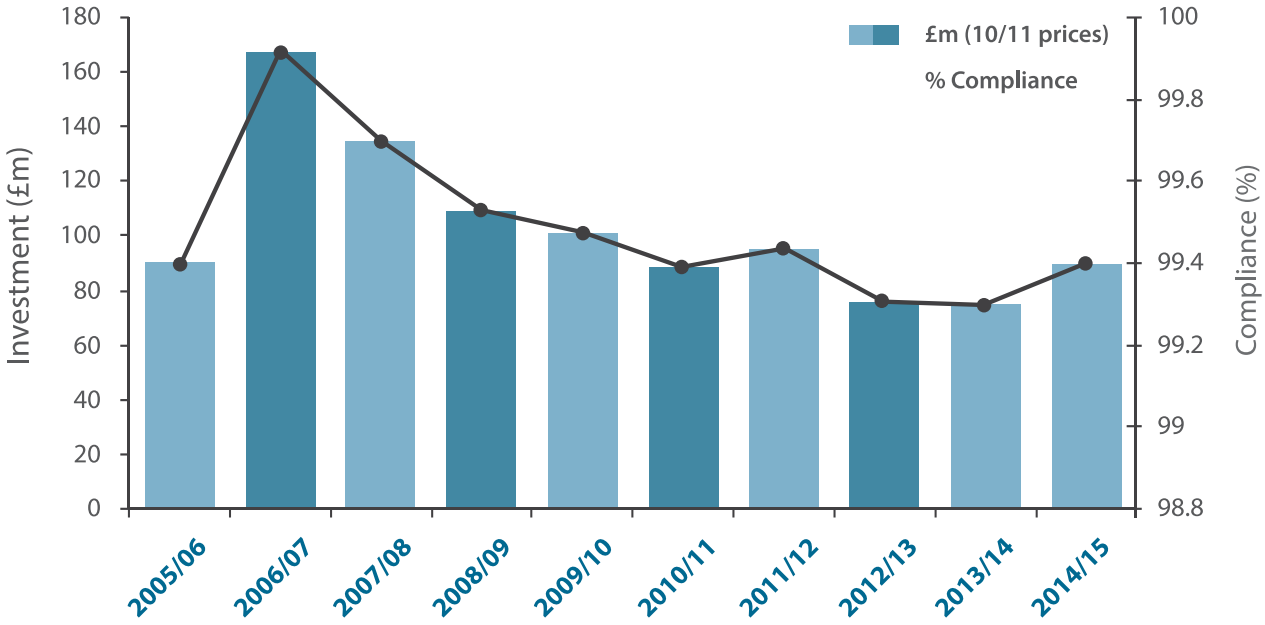
Figure 2.1 below shows how overall drinking water quality compliance has been improved. This has been achieved through sustained investment in water treatment facilities and on mains rehabilitation. Since 2007, the Executive has invested over £500 million to maintain and improve water services.

Water Resources

2.6 Changing climatic conditions such as reduced rainfall and higher evaporation losses (from reservoirs) in the summer, are recognised by the Water Framework Directive[7] (WFD) which promotes the sustainable use of water resources and requires users to use water resources efficiently.

NI Water currently abstracts around 570 million litres of water for distribution every day (Ml/d) and is authorised to abstract up to 1,045 Ml/d under license[8]. Water resources are currently limited by NI Water's water treatment capacity of approximately 830 Ml/d. These abstraction volumes may need to be rationalised to protect our water sources and meet the aims of the WFD. In addition, it is essential that the quality of

Figure 2.1 Drinking Water Quality Compliance



7 Council Directive 2000/60/EC

8 Raw water abstraction is licensed by NIEA under the Water Abstraction and Impoundment (Licensing) Regulations (Northern Ireland) 2006.

raw water in these sources is protected. These water supplies are mainly obtained from surface water sources such as rivers, loughs and reservoirs (99.9%) with 0.1% from boreholes. Hence, it is also important to consider all options of water supply objectively as part of a solutions mix including groundwater.

Private Supplies

2.7 Less than 1% of the Northern Ireland population is served by private water supplies. The majority of these are from groundwater sources, most commonly, boreholes. The Drinking Water Inspectorate (DWI) regulates the quality of private supplies with the support of staff from the Environmental Health Department of local councils who collect samples, assist in follow-up investigations and carry out risk assessments at private water supplies.

2.8 There were a total of 134 private supplies on DWI's register in 2014. It is estimated that there are approximately a further 1,200 private supplies to single private dwellings, which are not required to be registered. DWI's results show that out of a total of 10,268 tests carried out on registered private supplies in 2014, 98.91% met the regulatory standards. More information on the quality of private supplies can be found in DWI's Annual Drinking Water Quality Reports[9].

Challenges to Drinking Water Supply

2.9 We often take our water supply for granted. It is often only when we experience supply interruptions that we take notice of what goes into providing us with safe clean drinking water. It takes a significant amount of electricity and chemicals to remove impurities to enable the water treatment processes to produce high quality drinking water. Only 4% of treated water is consumed. The majority is used for other purposes (toilets and showers). If we reduce the amount of water we use, our carbon footprint will be smaller. Using fewer chemicals will also be beneficial for the environment.

2.10 Delivering clean, safe drinking water to approximately 825,000 households and businesses currently requires around 560 million litres per day of water to be abstracted, treated and distributed.

This must then be returned to the environment through sewer mains, using pumping stations, wastewater treatment works and sludge management centres. There are, therefore, many challenges to continuing to provide safe, sufficient supplies of drinking water. Some of the key challenges are set out in Figure 2.2 on the next page.

9 https://www.doeni.gov.uk/topics/water/drinking-water-quality

Figure 2.2 Key Challenges Drinking Water Supply

Funding	Our water and sewerage services currently cost around £370m per year[10]. Water and sewerage costs are likely to increase with population growth, development and energy price rises. Customers' bills[11] may have to be increased to meet these costs.
Drinking Water Quality Compliance	We continue to enjoy clean safe drinking water, the quality of which achieves high levels of compliance with the regulatory standards. However, sustaining these high compliance levels is challenging and will continue to require significant investment to maintain and improve water infrastructure and assets.
Security of Supply	While the quantity of water available for human use is largely sufficient to meet our needs now, this may not be the case in future. Climate change predictions indicate that there will be pressure on water resources in future. Low summer flows in some local rivers are already resulting in a reduction in water available for abstraction in some areas. Groundwater could be utilised for augmenting river flows during low flow times to maintain ecological flow needs. Anecdotal evidence also suggests that groundwater has been utilised during dry springs and summers in the past. In addition, we will need to consider the impact of population growth and changing demographics on water demand.
Carbon and Green House Gas Emissions	Maintaining a pressurised water system and providing appropriate treatment requires large amounts of energy. NI Water is our largest single electricity user (with electricity and UK Carbon Reduction Commitment Scheme costs over £32m per year in 2014/15). This energy use is likely to continue rising with future development and growth.
Protecting the Environment	Abstracting large amounts of water can lead to low river flows, water scarcity and can place natural ecosystems at risk. The risk of environmental damage will continue to increase if more water is abstracted to facilitate growth and/or we experience increased periods of dry weather and drought.

10 As identified in PC15 revenue requirement

11 Domestic water and sewerage bills are currently subsidised by the NI Executive.

Drinking Water Strategy

Need for Change

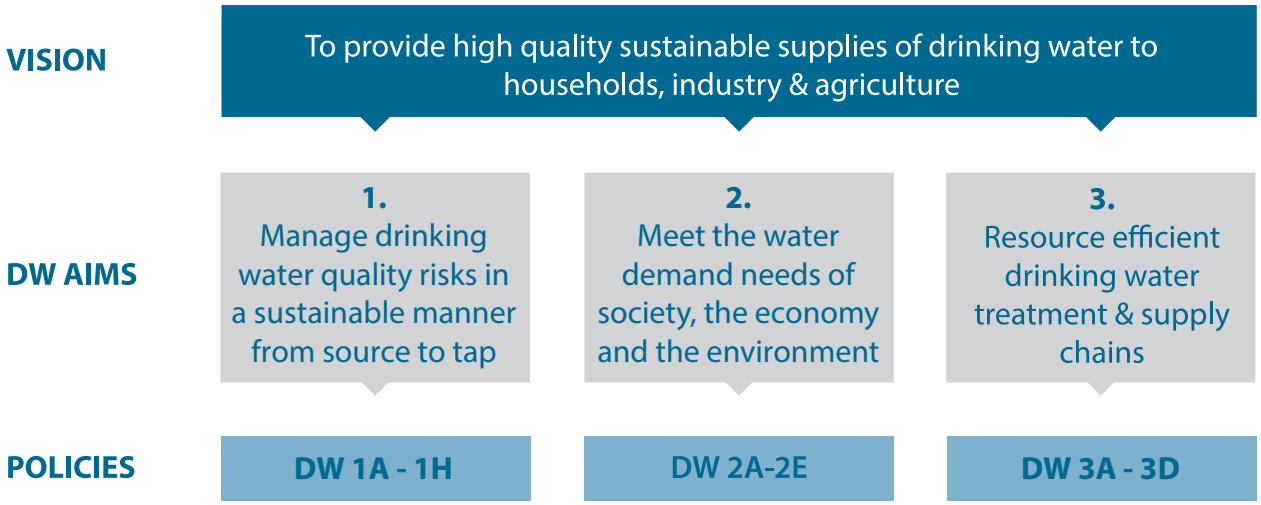
2.11 Meeting these challenges requires a more sustainable approach to drinking water supply and treatment from the catchment through to consumers' taps. We cannot afford to reverse the substantial reductions made in the amount of water we abstract from the environment. Nor can we continue to rely on expensive high energy drinking water treatment solutions. We must also actively manage water demand and introduce more sustainable treatment solutions to meet the aims of the Water Framework Directive on the protection and sustainable use of water resources. The long-term vision is to '**provide high quality, sustainable supplies of drinking water to households, industry and agriculture and ensure adequate quantities of water are maintained in the environment**'. This requires a more sustainable approach to managing the drinking water supply chain from the water source right through to the consumers' taps.

This involves:

- Protecting and improving the quality and quantity of drinking water sources by building in effective contamination risk resilience through enhanced drinking water protection.
- Improving the efficiency of drinking water abstraction and treatment by considering all water supply options in an objective appraisal with a view to designing a solutions mix.
- Maintaining a sufficient supply of high quality drinking water through resilient and efficient distribution systems.
- Managing water consumption by improving water efficiency in homes and businesses.

The strategy for achieving this vision is set out in the remaining sections of this chapter and is structured around three key aims and a number of policies as shown in Figure 2.3 below.

Figure 2.3 Drinking Water Strategy



DW Aim 1:

Manage Drinking Water Quality Risks in a Sustainable Manner from Source to Tap

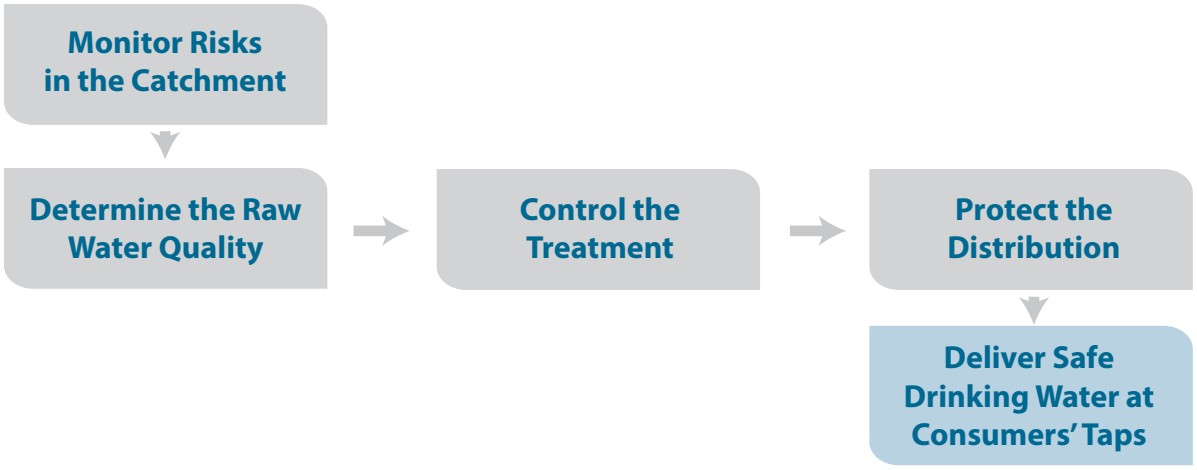
2.12 Providing high quality drinking water to our homes and businesses involves taking water from the environment, transporting it to a treatment facility and supplying it, through a pressurised distribution system, to our taps. The water supplied must be of a very high quality and be safe and clean to drink. It is also important to ensure that the drinking water supply process is affordable and not detrimental to the environment. This aim is about identifying and managing potential contamination risks which could affect the quality of the drinking water supply chain. This includes managing the risks of contamination throughout the supply chain whether at source, treatment and distribution systems or supply pipes. The following paragraphs set out a number of policies (DW 1A-1H) for achieving this aim.

DW Policy 1A:

Maintain and review Drinking Water Safety Plans for all drinking water catchments

2.13 NI Water monitors the quality of its drinking water sources to identify potential quality risks (e.g. pesticides and natural organic matter). This is the first stage of the Drinking Water Safety Plan (DWSP) approach required by water quality regulations[12]. This is the most effective way of ensuring that a water supply meets the health based standards and other regulatory requirements throughout the water supply chain. It is based on a comprehensive risk assessment and management approach to all the supply stages from catchment through the treatment process and onwards through the distribution systems to consumers. This is illustrated in Figure 2.4 below.

Figure 2.4 Drinking Water Safety Plan Approach



12 SR147/2007 as amended by SR246/2009 and SR128/2010

2.14 The primary objectives of DWSPs are the identification and mitigation of risks through the minimisation of contamination of source waters, the reduction or removal of contamination through appropriate treatment processes and the prevention of contamination in the distribution network and the domestic distribution system.

Drinking Water Safety Plans should be maintained and kept under review for all drinking water catchments to inform a prioritised investment programme of mitigation actions.

DW 1A Proposed Actions:

- Maintain and review Drinking Water Safety Plans for all drinking water catchments.
- Continue to implement a prioritised investment programme to manage drinking water quality risks informed by DWSPs.

DW Policy 1B:

Put effective protection measures in place for drinking water sources.

2.15 Protecting the water in areas from which it is abstracted not only improves the raw water quality but can also mitigate against future increases in water treatment costs. This is recognised by the Water Framework Directive[13] (WFD) which requires water bodies used for abstraction for drinking water purposes to be designated as Drinking Water Protected Areas (DWPAs) and appropriate monitoring and protection measures to be put in place. All drinking water sources should, therefore, be designated as DWPAs to provide appropriate regulatory protection and help prevent future deterioration of drinking water sources in line with WFD principles.

DW 1B Proposed Actions:

- Review the designation of all existing (and future) drinking water sources as Drinking Water Protected Areas (DWPAs) and ensure appropriate monitoring and regulatory protection measures are put in place.

DW Policy 1C:

Introduce sustainable catchment management at all drinking water sources.

2.16 Contaminants such as organic matter, fertilisers and pesticides that are washed into our drinking water sources can be difficult and expensive to remove through the treatment process. However, it is possible to reduce these contaminants through sustainable catchment management. This covers a wide range of activities including: managing livestock to prevent over-grazing; restoring areas of eroded/exposed peat; improving farm management to reduce pesticide and fertiliser run-off; and education and public awareness campaigns.

2.17 All land owners should, therefore, be encouraged to adopt sustainable land management practices to protect and improve raw water quality in DWPAs through education, incentives and enforcement action (where appropriate). Sustainable catchment management is also set out in EP Aim 2 in Part 4 of this Strategy.

13 Council Directive 2000/60/EC

2.18 Figure 2.5 shows a sustainable catchment management scheme in England[14] where a large area of peat bog was stabilised and restored. The first photograph shows how overgrazing and weathering can cause erosion of peat bogs. The exposed peat is easily washed into the catchment.

Figure 2.5 Sustainable Catchment Management

2.19 The second photograph shows how peat bogs can be restored and protected to prevent organic matter being washed into the water source. This not only improves raw water quality, but also restores valuable habitats and natural drainage systems. The water retention benefits of restoring peatlands can also be important for managing flood risk in the catchment. This is covered in FRMD Policy 2B in Part 3 of this Strategy.

2.20 As one of our largest land owners, NI Water can make a valuable contribution to improving raw water quality through sustainable catchment management. Through its SCAMP NI[15] project (http://www.niwater.com/our-environment/) NI Water has already begun work in several catchments, including those in the Mourne Mountains, Garron Plateau and River Derg. NI Water will be expected to continue to implement and, where appropriate, extend its SCAMP project to all of its drinking water catchments. However, it should not be for NI Water alone to improve our catchments. These innovative approaches require co-ordinated action by many stakeholders including central and local government, private land owners, farmers, environmental protection organisations and local community groups who all have responsibility and an interest in improving the quality of our inland waters.

2.21 One such example is the Water Catchment Partnership[16] which has been established to help address significant water quality issues in Northern Ireland. Its aim is to proactively work together to promote and raise awareness of best practice when using pesticides in the garden or on the farm, through a voluntary approach to improve water quality.

14 Quiet Shepherd Peat Bog stabilisation carried out by United Utilities in 2009.

15 Sustainable Catchment Area Management Planning

16 The Water Catchment partnership is a working partnership established from representatives from Ulster Farmers Union, Northern Ireland Water, Northern Ireland Environment Agency and DARD's College of Agriculture, Food and Rural Enterprise.

Pesticides include herbicides, weedkillers, fungicides and, insecticides. The initial focus is in the Derg catchment and, if the project is successful, the scheme will be rolled out to other drinking water catchments.

DW 1C Proposed Actions:

- Actively encourage sustainable land management practices around DWPAs (through education, incentives and enforcement).
- Establish effective public/community/voluntary sector partnerships to jointly deliver sustainable catchment initiatives and education campaigns to protect and improve raw water quality (e.g. the Water Catchment Partnership).
- Raise public awareness of groundwater and educate those with private water supplies that utilise groundwater. Consider how to protect quality of groundwater supply.
- Continue to implement and extend the SCAMP project to all drinking water catchments including appropriate monitoring.

DW Policy 1D:

Manage water quality risks from the water distribution system

2.22 The water distribution system is an extensive and complex network. As water travels through this network, quality may deteriorate depending on the condition and structural integrity of the distribution network, the nature of the water and the materials with which it comes into contact. For example, service reservoirs whose structural integrity has not been maintained are at risk from ingress of microbiological contaminants and old cast-iron pipes which have corroded over time may result in discoloured or 'rusty' water at the tap. NI Water has a programme in place to ensure that all service reservoirs are regularly cleaned and checked for integrity. The company also has a disinfection policy in place that ensures a residual disinfection is maintained throughout the water supply system for the protection of human health. Systems are also in place to ensure that disinfection by-products (e.g. THMs[17]) are kept to a minimum while maintaining microbiological safety in line with the Water Supply (Water Quality) Regulations (Northern Ireland) 2007[18].

2.23 Many of NI Water's older water mains are made of cast iron. Deterioration in iron mains can result in discoloured drinking water due to the presence of iron or manganese. In 2014, nearly 70% of all customer complaints on water quality were related to appearance. NI Water has an extensive rehabilitation programme to restore/replace the existing water mains pipe work. This takes into consideration many factors including water quality, water pressure, leakage and bursts. The Water Mains Rehabilitation Programme should continue to focus on preventing service deterioration, targeting water quality issues and addressing consumer complaints.

17 Trihalomethanes (THMs) are chemical compounds that can be formed when water is disinfected with chlorine. THMs occur when chlorine reacts with organic matter (e.g. peat) in water.

18 SR 147/2007 as amended by SR246/2009 and SR128/2010

2.24 Due to the scale of the network, it can be difficult to determine the exact locations of where water mains have deteriorated. Drinking water quality targets should, therefore, continue to be developed for the Water Mains Rehabilitation Programme focused on addressing iron contraventions and drinking water quality complaints (particularly complaints in relation to colour, taste and odour).

DW 1D Proposed Actions:

- Continue to effectively manage and operate the distribution system to prevent deterioration in drinking water quality.
- Develop drinking water quality targets focused on addressing iron exceedences and consumer complaints.
- Continue Water Mains Rehabilitation Programme focused on preventing service deterioration, targeting water quality issues and addressing consumer complaints.

DW Policy 1E:

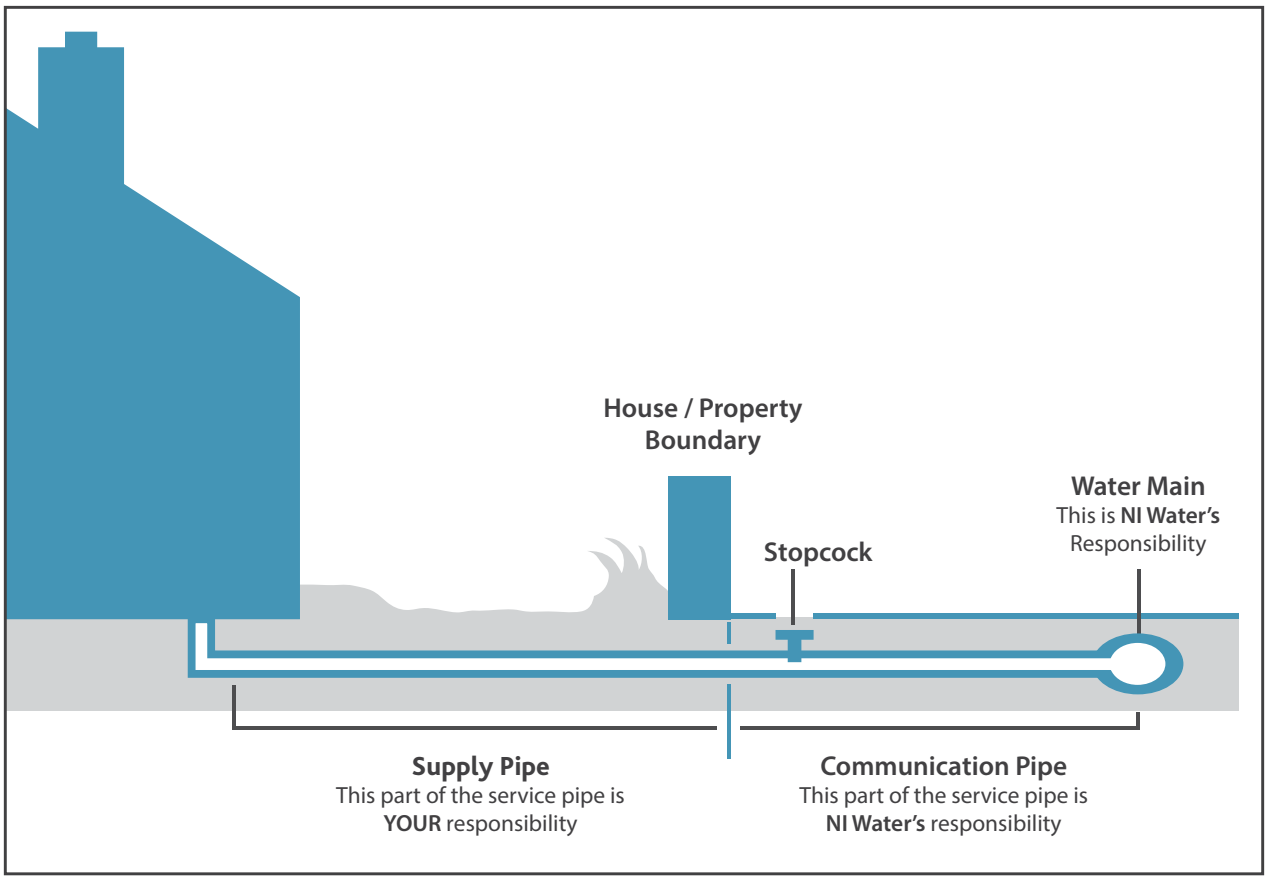
Remove lead pipes and fittings from drinking water supply systems

2.25 Lead occurs naturally in the environment and, for many centuries, was the preferred material used in pipes and conduits for transporting drinking water (the word plumbing is derived from the Latin for lead). This was due to its resistance to corrosion, malleability and smooth surface. Lead was still in common use in the UK for small bore pipes and pipe fittings until the 1970s in both public supplies and private plumbing. Since then, the growing evidence base for its detrimental effect on human health has resulted in it being banned from use in potable water supplies. Those at greatest risk from exposure to lead in drinking water are young children and unborn babies. It is a cumulative poison that affects the nervous system and can affect some aspects of child development (both size and intelligence).

2.26 The World Health Organisation, in its booklet on Childhood Lead Poisoning (WHO, 2010) has drawn attention to: (i) recent research that indicates that lead is associated with neurobehavioural damage at blood levels of 5 µg/dl (micrograms of lead per decilitre of blood) and even lower (currently 10µg/dL is considered to be the trigger for concern); and (ii) there appears to be no threshold level below which lead causes no injury to the developing human brain. Exposure to lead in drinking water has reduced significantly as a result of NI Water's twin-track approach of orthophosphate treatment to reduce plumbosolvency (the tendency of lead to dissolve in water) and the identification and replacement of lead pipes within the NI Water infrastructure. Compliance with the European lead standard for drinking water (10µg/l from December 2013) has steadily improved over the last 7 years with just over 97% of water samples complying with the 10 µg/l standard in 2014. NI Water's strategic lead policy and lead pipe replacement programme should, therefore, continue to focus on improving compliance with the lead standard.

2.27 'In-situ' lead pipe work is still prevalent within the boundary of many older properties and is normally privately owned. Figure 2.5 shows the supply pipe arrangements for a typical household. Customers are responsible for the section of service pipe within their property boundary. This is known as the supply pipe. NI Water is responsible for the communication pipe outside the property boundary.

Figure 2.5 Typical Water Supply Pipe Arrangements



2.28 Through its Water Mains Rehabilitation Programme, NI Water informs householders when lead communication pipes (from the water main to the property boundary line) have been replaced to encourage them to replace their lead supply pipe work. NI Water will also replace the lead communication pipe when a customer replaces their supply pipe. However, less than 20 customers approach NI Water each year and only around 20% of property owners take the opportunity to replace their supply pipe when the mains rehabilitation work is in their area. These figures show that a significant amount of work is required in addition to the existing NI Water-led activities to improve compliance particularly in managing the risk from private lead supply pipes. A long-term government approach is, therefore, needed to manage the risk created by privately owned lead supply pipes.

2.29 NI Water has carried out a desktop analysis to assess the possible quantities of lead in the drinking water system. It is estimated that as many as 100,000 properties could have lead supply pipes. To replace all these pipes could cost tens of millions of pounds. Properties that have or have had lead private supply pipes may also have lead pipes in their internal plumbing. Although this is beyond both the public supply and drinking water sample point, it is a further risk of lead ingestion and the risk of exposure to lead from these sources needs to be reduced. Education on how to minimise the risks of lead internal plumbing (for example, taking drinking water only from the kitchen tap) should be included in any government initiative.

DW 1E Proposed Actions:

- NI Water should continue implementing its strategic lead policy and lead pipe replacement programme focused on the aim of removing all lead pipes from the public supply system and improving compliance with the EU Lead standard (10µg/l).
- Proposals to aid the improvement of private supply pipes including the removal of lead from private supply pipes should be considered in order to meet the EU lead standard (10µg/l) and provide safe wholesome supplies of drinking water.
- An education programme should be developed to highlight the risks posed by lead (including lead in internal plumbing) and how exposure to lead from drinking water can be reduced / eliminated.

DW Policy 1F:

Manage water quality risks from defective water fittings

2.30 The Water Supply (Water Fittings) Regulations (Northern Ireland) 2009 set out minimum performance standards for water using apparatus (e.g. toilets, dish washers, washing machines, etc). The Regulations aim to reduce the risk of contamination and reduce wastage of water supplied by NI Water through the use of specified water fittings and methods of installation. The Regulations apply to all plumbing systems, water fittings and appliances connected to the public water supply. They help to ensure that any plumbing system in your home or business is installed and maintained correctly. Complying with these Regulations can help to prevent any potential contamination of the public water supply or to other parts of your home or business. NI Water is responsible for enforcing the Regulations in all properties that have a public water supply. More information on the Regulations can be found at https://www.niwater.com/water-fittings-regulations.aspx

2.31 If you are an owner or occupier of a property or you install or maintain plumbing systems and water fittings, you have a legal obligation to meet the requirements of the Regulations. In addition, architects, developers, plumbers and builders need to ensure that the requirements are met for future owners or occupiers. In most cases, before you start work on plumbing installations or undertake any changes to your water system, you as the owner, occupier or installer must obtain approval from NI Water by giving advance notice of the work. However, in many cases, the use of a licensed plumber means that you are not required to give advance notification directly to NI Water. All work undertaken by a licensed plumber is also covered by a warranty scheme. A list of licensed plumbers is available from WaterSafe at https://www.watersafe.org.uk/.

2.32 WaterSafe is a dedicated online search facility bringing together thousands of qualified contractors employed by plumbing businesses from the seven existing Approved Contractors' Schemes across the UK. Its aim is to help customers to find the nearest qualified plumbing and heating professionals in their area and promote water safety in the home and for businesses.

2.33 Approved plumbing businesses must adhere to the WaterSafe customer commitments, conditions of membership and scheme rules. Where businesses fail to meet these standards, a disciplinary process applies. A member business, which fails to uphold the standards, will be subject to a range of penalties. In serious cases, this would result in membership of WaterSafe being revoked.

DW 1F Proposed Actions:

- Continue to effectively monitor and regulate compliance with the Water Supply (Water Fittings) Regulations (Northern Ireland) 2009 and reduce the risk of contamination or waste of public water supplies through defective water fittings.
- Educate and improve public awareness of the importance of compliant water fittings and using licensed plumbers (Watersafe).
- Ensure all publically owned drinking water systems comply with the Water Fittings Regulations.

DW Policy 1G:

Manage water quality risks from private water supplies

2.34 NI Water supplies water to over 99% of the population. The remainder of the population is served by private water supplies. Although the number of people served by private water supplies may be small, more people are exposed to them through holiday accommodation (e.g. hotels, bed and breakfast facilities), public buildings such as hospitals and universities, and from the use of private supplies in the manufacture of food and drinks.

2.35 Private water supplies are required to comply with the same standards as the public water supply and must also have a risk assessment undertaken. The risks of contamination of private water supplies, and rates of non-compliance with quality standards, are higher than for the public supply and these are required to be managed accordingly in order to protect public health. Private supplies often abstract from groundwater sources and

have minimal treatment infrastructure in place and can present different risks from those presented in public systems. For example, private supplies can be particularly susceptible to contamination by coliforms as a result of agricultural runoff.

DW 1G Proposed Actions:

- Maintain an effective water quality monitoring programme for private supplies.
- Work with water regulators, district councils and private supply owners to further develop risk assessments at private water supplies to ensure Water Safety Plans are in place at private water supplies.
- Increase public awareness of, and how to protect, groundwater. Educate private well owners on how to protect their well source.

DW Policy 1H:

Manage water quality risks for domestic distribution systems

2.36 Where there is a public water supply to buildings, such as hospitals and schools, the building owners must ensure that there is no deterioration in the drinking water quality as a result of the distribution of the water throughout the site. This onward distribution of the water through the building's domestic distribution system is regulated to ensure that it does not present a risk to members of the public. The Drinking Water Inspectorate has responsibility to ensure that appropriate remedial measures are taken by the building owner (where there are water quality failures identified under domestic distribution system regulations and which are related to the onward distribution of water within these buildings).

DW 1H: Proposed Actions:

- Continue monitoring and regulation of domestic distribution systems.
- Government to commence a programme of improvement to government-owned domestic distribution systems.
- Develop and implement an education programme to increase public awareness of the importance of properly maintained and monitored domestic distribution systems.
- Promote the use of a Water Safety Plan approach within buildings where water is made available to the public in line with WHO[19] principles.

19 http://www.who.int/water_sanitation_health/hygiene/settings/watsafpubuildings/en/

DW Aim 2:

Meet the Water Demand Needs of Society, the Economy and the Environment

2.37 NI Water supplies water to approximately 825,000 properties. This is a difficult task during normal climatic conditions but becomes extremely challenging during extreme weather. This was illustrated with the major supply issues that resulted from the freeze-thaw event in December 2010. Climate change predictions indicate that the frequency of extreme weather events is likely to increase. It is also predicted that lower flows will be available for abstraction in future. Demand for water may also increase due to population growth and economic development. We will need to ensure that flows in rivers and streams are protected to support biological diversity. NI Water is currently authorised to abstract up to 1,045 Ml/d under license[20]. However, these abstraction volumes may need to be rationalised to protect our water sources and meet the aims of the Water Framework Directive. The energy required to treat and supply drinking water is also of concern. Despite the recent drop in energy prices, it is projected that NI Water's energy bill and UK Carbon Reduction Commitment Scheme costs will continue to rise as energy costs, treatment and supply requirements increase.

2.38 This aim is about ensuring that a secure, resilient supply of water is available to meet the water needs of society, the economy and the environment in future. For this to be sustainable we must move towards making our use of drinking water more sustainable by reducing our demand for water and by reducing waste as we consume water. Reducing water demand has the benefit of improving energy efficiency, security of supply and reducing the impact on the environment. This will require improvements to the water supply system to reduce leakage and improve water efficiency in homes and businesses and to promote water re-use and recycling. The long-term target is to reduce average consumption from 146 litres per head per day (l/h/d) in 2014 to 130 (l/h/d) by 2040.

DW Policy 2A:

Provide access to efficient, safe, secure drinking water supplies

2.39 Approximately 99% of the population are currently connected to the public drinking water supply network. The long-term aim is to connect as many properties as possible to the public supply system where this is requested by the customer and assessed to be economically viable. NI Water provides a contribution towards the initial cost of providing a connection. In addition, the Northern Ireland Executive provides a further financial contribution to ensure that the cost of new water connections remains affordable to householders and businesses. More information on water connections can be found at http://www.niwater.com/water/.

20 Raw water abstraction is licensed by NIEA under the Water Abstraction and Impoundment (Licensing) Regulations (Northern Ireland) 2006.

2.40 However, it is not possible to provide and maintain a public supply to all properties. The infrastructure and operational costs associated with pumping drinking water to isolated rural dwellings on elevated sites can be prohibitive. For this reason, in 2012, the Executive introduced a Rural Borewells Scheme. During the three years of the Scheme, 80 householders who could not access the public main gained a wholesome water supply for the first time. These householders now have the assurance of a high quality water supply that is safe to drink. After three years, the Rural Borewells Scheme closed on 31 March 2015. The Scheme also provided new geological information which could assist in identifying where best to abstract water from the environment and natural sources of contamination of water supplies.

2.41 To manage future water supply costs it is important that any planned development can be efficiently served by the public drinking water supply system. This is recognised in the Regional Development Strategy[21] which recommends that land-use planning should be informed by current water and sewerage infrastructure and future investment programmes. This will involve close cooperation between Planning Authorities and the water industry in the preparation of Local Development Plans (LDPs) and water investment programmes.

DW 2A Proposed Actions:

- Continue providing financial assistance towards the initial cost of providing a water connection to encourage connections to the public supply system.
- Consider improved mechanisms to ensure that NI Water and the planning authorities effectively integrate water investment and development plans and ensure customers' water needs are efficiently met in the future.

DW Policy 2B:

Water resource management and drought planning to inform long-term investment needs

2.42 NI Water's Water Resource Management Plan (WRMP) sets out its strategy for maintaining drinking water supplies over the period 2010 to 2035. The WRMP takes into account forecast changes in population, housing and water usage and incorporates any predicted changes to our climate. The average volume of water needed in the supply system has reduced from around 735 megalitres per day (Ml/day) in 2001/02 to around 560 (Ml/day). This reduction equates to around 70 Olympic-sized swimming pools per day and has been achieved through sustained investment in water mains to reduce leakage along with reduced demand, particularly in the industrial sector. However, water demand needs to be reduced further if we are to protect our water sources, facilitate future development and reduce the carbon and financial costs of drinking water provision in the future.

21 https://www.drdni.gov.uk/publications/regional-development-strategy-2035

2.43 In addition to a WRMP, NI Water is also required to produce a Drought Plan setting out measures needed to safeguard drinking water supplies and the environment during a period of drought. The WRMP and Drought Plans are currently required to be produced and reviewed at different intervals which do not align with current investment cycles. The Water and Sewerage Services Bill, which was passed by the Assembly in January 2016 will simplify current legislation to require the preparation, and bi-annual review, of a single water resource and supply resilience plan to inform water investment plans. The plan should also identify adaption and resilience measures in response to climate change predictions and take account of NIEA's proposed review of water abstraction and impoundment licences.

DW 2B Proposed Actions:

- Amend existing legislation to facilitate the development of a single water resource and supply resilience plan.
- Develop and issue Guidance for developing a single water resource and supply resilience plan.
- NI Water should follow this Guidance in preparing the plan which should be published by 1 April 2017.
- NI Water should follow future editions of the Guidance to inform the preparation of future water resource and supply resilience plans.

DW Policy 2C:

Put effective systems and processes in place to avoid over abstraction

2.44 The Water Abstraction and Impoundment (Licensing) Regulations (Northern Ireland) 2006[22] provide controls on water abstractions and impoundments in Northern Ireland.

All significant operators, like NI Water, who have a licence to abstract from surface water or groundwater under the regulations are required to have monitoring systems in place or, in respect of hydro operations to produce a monitoring plan 3 months prior to commencement of the operation.

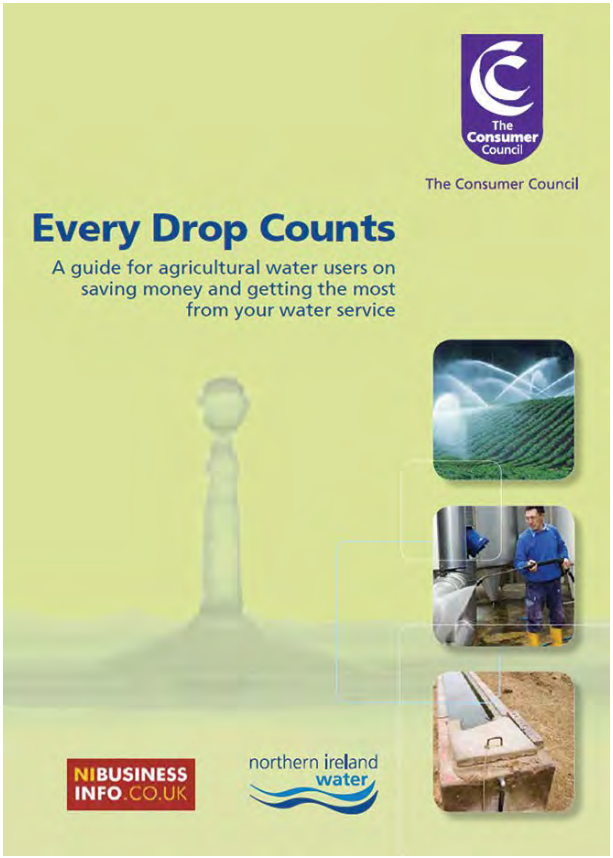
2.45 The Northern Ireland Environment Agency (NIEA) needs accurate information on abstractions to carry out its duties[23] and meet the WFD's objectives on promoting sustainable water use and preventing deterioration of, and protecting/enhancing the water environment. NIEA is planning to carry out a review of abstraction licences and introduce flow monitoring at all drinking water sources which are not meeting high or good water resource flow standards in line with the WFD. This review should factor in the costs of abstraction licences. It is also proposed to make continuous flow monitoring a condition of all new significant abstraction proposals. Information required for groundwater abstraction licences include abstracted volumes and changes in groundwater levels.

22 SR 2006/482

23 Duties under the Water Environment (Water Framework Directive) Regulations Northern Ireland 2003

2.46 Every day NI Water currently draws around 570 Ml/Day from the environment and supplies around 560 Ml/day of drinking water with the additional water used in the treatment processes. NI Water has active licenses to abstract up to 1,045 Ml/day and this ensures that NI Water has access to additional raw water reserves. There is the potential to develop groundwater to be utilised during major supply incidents and it could also have a role to play in ensuring supplies in emergencies.

2.47 However, NI Water must ensure that it doesn't abstract more water than it needs even during extreme events. It is, therefore, important that the abstraction and treatment processes are efficient and effective and that all water abstracted is used directly for supply, or for water treatment processes.



DW 2C Proposed Actions:

- Review the effectiveness of drinking water abstraction processes to ensure all water taken from the environment is needed for supply and/or treatment.
- Develop, agree and implement drinking water abstraction monitoring and management plans.
- Manage and review abstraction licences to ensure sustainable water resources are available to meet society's needs without compromising the environment. This will factor in the costs of future abstraction reductions (e.g. new treatment works or trunk mains).

DW Policy 2D:

Encourage households and businesses to be water efficient

2.48 The long-term target is to reduce average water consumption from 146 l/h/day to 130 l/h/day. The Water Framework Directive[24] (WFD) promotes the sustainable use of water resources through water pricing. Water pricing arrangements for the agriculture and industrial sectors have been in place for many years. The majority of these customers are metered and charged according to usage. This is in line with the WFD's requirement for users to use water resources efficiently and promotes the polluter pays principle.

24 Council Directive 2000/60/EC

2.49 It is recognised that metered water charges are the most effective means of incentivising consumers to conserve and use water efficiently. The continued roll-out of meters to non-domestic customers should further incentivise efficient water use in this sector. However, other water efficiency initiatives should also continue to be implemented to incentivise reduced consumption. Current initiatives include the Water Champions Awards, developed by the Consumer Council, with the support of Invest NI and NI Water. This award is aimed at helping businesses and farms improve water efficiency and save money on bills. Consumer Council has also produced an 'Every Drop Counts[25]' guide to help businesses and farms improve their water efficiency, get the best service and save money on their bills.

2.50 It is considered that households make a contribution towards the costs of their water and sewerage services through their domestic rates. NI Water also receives government subsidy in lieu of all domestic charging. The Northern Ireland Executive has given a commitment that additional household water and sewerage charges will not be introduced during its current Programme for Government (2010-16). In the absence of metered water charges, households should continue to be encouraged to use water efficiently through targeted education and public awareness campaigns.

2.51 NI Water already provides education programmes tailored to the school curriculum. This includes classroom visits, tours of its facilities, an interactive educational section on its website and the Water Bus - a double-decker bus transformed into a mobile education unit.

It concentrates on the many aspects of water and is aimed at Key Stage 1 and 2 pupils.

2.52 If you would like the Water Bus to visit your school or event, please contact NI Water at education@niwater.com or (028) 9035 4716. In addition, NI Water carries out public awareness campaigns such the 'Don't Wait, Insulate' winter preparation campaign.

2.53 A study called 'At Home with Water'[26] carried out by the Energy Savings Trust has shown that water efficiency can reduce energy bills. On average, 16% (or £228) of a household's annual energy bill (electricity and gas/oil) is from water–using activities. Heating water for showers, baths, washing up and electrical appliances contributes to a lot of energy bills. But this link often goes unnoticed by householders. For example, if every household in the UK took just one minute off one shower every day, it would save £215 million in energy bills a year nationwide.

2.54 This link between water consumption and energy bills should be used to encourage households to use water more efficiently and meet the aims of the WFD. This should be carried out through effective education and public awareness campaigns.

25 http://www.consumercouncil.org.uk/filestore/documents/Every_Drop_Counts_Web_Final.pdf
26 http://www.energysavingtrust.org.uk/sites/default/files/reports/AtHomewithWater%287%29.pdf

DW 2D Proposed Actions:

- Continue to invest in education and public awareness campaigns to promote water efficiency and the value of water, supported by continued work of the Water Bus and school visits, and other educational means.
- Develop and implement a public awareness campaign highlighting the benefits of water efficiency and how it can lower energy bills.

DW Policy 2E:

Deliver water efficient residential and commercial development

2.55 Only around 4% of water supplied to an average household is used for drinking. Toilets account for around 30% of drinking water usage. Properties can be built or modified to be more water efficient in high consumption areas. For example, new properties could include recycling systems where grey water from washing machines is used for toilets.

2.56 The Regional Development Strategy[27] recognises the need to manage water demand in new developments. Regional Guidance (RG12) recommends that '*consideration should be given to including measures such as grey water recycling and rainwater harvesting*'. An average water consumption limit of 130 l/h/day should be encouraged for all new residential developments. Research suggests this is a reasonable target. Consideration could be given to amending the Water Supply (Water Fittings) Regulations (Northern Ireland) 2009 to include a performance rating for water fittings.

2.57 To inform this policy, pilot projects should be undertaken to test and approve different water efficiency / reuse technologies. Water savings devices such as aerated shower heads and water butts can also be retro-fitted into existing properties. Consumers should be encouraged to install these measures through public awareness campaigns or a grant scheme. It is recognised that some of the more expensive water savings measures such as water recycling may not be cost effective for households in the absence of water charges.

Figure 2.6

Average Water Usage In One Household Per Day (NI Water)

- 7% Outdoor
- 8% Washing Up
- 4% Drinking Water
- 5% Other
- 13% Clothes Washing
- 12% Showers
- 21% Baths and Taps
- 30% Toilet Flushing

27 https://www.drdni.gov.uk/publications/regional-development-strategy-2035

DW 2E Proposed Actions:

- Consider regulatory options in which all future residential development is water efficient and aims to achieve a maximum consumption figure of 130 l/h/day.
- Carry out pilot projects to test and compare the cost effectiveness of different water efficiency / reuse technologies (for both retro-fitting and new build).
- Consider amending the Water Supply (Water Fittings) Regulations (Northern Ireland) 2009 to include a performance rating for water fittings.
- Develop and implement policies in respect of retro-fitting water efficiency/ recycling measures in homes and businesses.

DW Aim 3:

Resource Efficient Drinking Water Treatment and Supply Chains

2.58 A significant volume of water can be lost through the process of abstracting water from its source, pumping it to a treatment works, treating the water to a high standard and then pumping it on to service reservoirs where it is distributed through a network of pipes to its final point of use. This process also requires a large amount of energy to transport more than 200 million tonnes of water each year to properties in Northern Ireland. NI Water is our largest single consumer of electricity and, despite the recent drop in energy prices, they are likely to increase over time. This aim is about providing greener, more efficient drinking water supply systems to minimise power costs and carbon emissions. This includes reducing leakage, improving energy efficiency and employing renewable energy. Policies are set out in the following paragraphs.

DW Policy 3A:

Achieve a Sustainable Economic Level of Leakage (SELL) in all supply systems

2.59 In order to provide sufficient water pressure at our taps and showers, water must be pumped at pressure through the distribution system. This causes water to leak from any defects in the system. This water has been abstracted, treated and pumped through the system and has financial and environmental costs. It is, therefore, important that leakage is kept to a minimum. However, with a pressurised system of over 26,700 km of pipe with thousands of joints vulnerable to ground conditions and traffic pressure, it will never be possible to reduce water leakage to zero. Through NI Water's annual Water Mains Rehabilitation Programme, 1,503 km of water mains were renewed between 2007 and 2013. This has improved water quality, pressure, supply interruptions and leakage.

2.60 In 2008/09, NI Water reported leakage of 181 Ml/day. Since then, NI Water has reduced losses to 166 Ml/day in 2014/15. In addition, NI Water has made the transition to new Netbase Leakage Management Software which complies with best practice. The Sustainable Economic Level of Leakage (SELL) is the level of leakage where it becomes economically and environmentally (in carbon terms) unviable to invest in further leakage reductions. This is because the cost of water being lost is less than the investment needed to fix the leakage. In 2014, the SELL was estimated to be 159 Ml/d. The Water Mains Rehabilitation Programme should continue to focus on leakage detection and reduction with the aim of achieving the SELL. The long-term plan is that by the end of the period (31 March 2021), NI Water should be able

to go beyond the SELL and achieve 153 Ml/d to encourage innovation and new technologies and processes which reduce leakage further.

2.61 Water leakage not only occurs in the public supply systems but also occurs in customers' supply pipes. It is estimated that over one quarter of leakage occurs in the private supply within customers' property. During the major freeze-thaw events in December 2010, it was estimated that 80% of all water lost was due to bursts on private supply pipes. NI Water informs customers where it identifies private site leakage and follows this up to check that it has been rectified. For metered non-domestic customers, there is a clear financial incentive to fix the leak. However, for non-measured non-domestic customers and households, there is no incentive to fix a leak unless it is impacting on drinking water quality or pressure. A policy on reducing private supply pipe leakage should, therefore, be developed.

DW 3A Proposed Actions:

- The current focus of achieving and maintaining the Sustainable Economic Level of Leakage within the public distribution system should continue and be used to inform the water mains rehabilitation programme.
- Proposals to aid a reduction in private supply pipe leakage should be developed and implemented.

DW Policy 3B:

Improve the energy efficiency of the public drinking water supply system

2.62 NI Water has an energy efficiency programme in place. Developments in water treatment and supply technology can contribute to improving the energy efficiency of the water supply system. In future, this could include installing energy efficient pumps and shortening water distribution distances, where feasible. Existing processes and systems should be continually reviewed to identify how energy efficiency savings might be achieved through innovative management and procurement of its assets and infrastructure. For example, taking account of whole-life energy/ carbon costs in project appraisals will help promote low energy asset or infrastructure solutions. The gradual introduction of more sustainable approaches to drinking water supply will help manage future increases in energy consumption.

DW 3B Proposed Actions:

- Review existing water treatment and supply systems to identify how potential energy efficiency savings might be achieved.
- Develop and implement a programme of energy efficiency improvements across the water and sewerage infrastructure and asset base.
- Develop short and long-term energy efficiency targets for NI Water through the water industry price control process (PC15/21/27).
- Revise NI Water's project appraisal process to ensure that drinking water investment decisions are based on 'whole-life' energy and carbon costs.

DW Policy 3C:

Increase the use of renewable energy in the public drinking water supply system

2.63 Due to our local demographics and rural landscape, it is recognised that large amounts of energy will continue to be needed to treat and pump drinking water large distances, no matter how efficient the supply systems are. To minimise carbon emissions, it is important that NI Water secures as much of this energy as possible from renewable sources such as wind, solar, hydro and anaerobic digestion. This should include exploring options to produce more energy in-house through use of hydro and wind turbines at water treatment facilities. This applies to the operation of both existing and new assets and infrastructure.

DW 3C: Proposed Actions:

- Consider investing in renewable energy generation (e.g. solar panels & wind turbines) to reduce running costs at existing drinking water facilities.
- Consider generating renewable electricity through innovative management of drinking supply systems (e.g. generating hydro-power from excess water mains pressure).
- Set targets for incentivising NI Water to increase the percentage of renewable energy generated by use of its own assets and lands and contribute to achieving the Executive's greenhouse gas emissions reduction target.

DW Policy 3D:

Reduce the amount of chemicals used in the drinking water treatment and supply systems.

2.64 The drinking water treatment process requires a range of chemicals to remove impurities and to disinfect the water to make it safe. For example, chlorine is used for disinfection and orthophosphoric acid is added to ensure tap water has not dissolved additional impurities from lead pipes along the way. The use of these chemicals in the treatment process is carefully monitored by NI Water and approved by the Drinking Water Inspectorate (DWI) to ensure that drinking water at the tap achieves stringent quality standards. Although the use of these chemicals is essential to ensure safe drinking water, they can have a negative impact on the environment if their use is not effectively managed and controlled. Treatment chemicals need to be effectively managed and monitored during all stages of the treatment process. This includes proper management of water which has been used in the treatment process and then returned to waterways to keep lake and river pollution incidents to a minimum. In the long-term, we should seek to minimise the use of chemicals by improving raw water quality through natural means such as SCAMP (DW Policy 1C) and by improving the supply system to minimise the amount of chemicals needed. A reduction in water demand could also assist in reducing chemical consumption.

DW 3D: Proposed Actions:

- Minimise the use of chemicals by improving raw water quality through natural means such as SCAMP (DW Policy 1C) and by improving the water supply system to minimise the amount of chemicals needed (e.g. orthophosphate).

Part 3 |
Flood Risk Management and Drainage

Setting the Scene

Introduction

3.1 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 businesses can be devastating.

3.2 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[28].

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.

Flooding at Ladas Drive, Belfast, Summer 2007

28 http://randd.defra.gov.uk/Default.aspx?Module=More&Location=None&ProjectID=15747

3.3 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

3.4 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, if flood waters negatively impact upon human health, the environment, economic activity or cultural heritage then this is unacceptable and should, were possible, be managed.

Our Wet Climate

3.5 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. In addition to our normally wet winters, 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[29].

Sources and Level of Flood Risk

3.6 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 as well as rising levels of groundwater. It is estimated that 46,000 (5.5%) of the approximately 825,000 properties in Northern Ireland could be at significant risk from flooding due to their location in coastal or river flood plains[30]. Approximately one third of these properties are protected to some extent by flood defence systems and the culvert network[31]. In addition, the surface water flood map for Northern Ireland indicates that around 20,000 (2.4%) of properties are sited in an area that is shown to be at risk of flooding from a significant rainfall event[32].

3.7 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[33], while in Scotland it is 1 in 22 homes and 1 in 13 businesses which are at risk[34].

29 https://www.doeni.gov.uk/publications/northern-ireland-environmental-statistics-report-2016
30 Preliminary Flood Risk Assessment and Methodology for Identification of Significant Flood Risk Areas in Northern Ireland, DARD, Dec 2011. DARD estimates that 5.5% 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.
31 DARD estimates that 15,500 of the 46,000 properties at risk have some form of flood defence in place.
32 Risk of flooding to a depth greater than 300mm from a 1 in 200yr (0.5% AEP) rainfall event.
33 Flooding in England: A National Assessment of FloodRisk, 2009, Environment Agency.
34 The National Flood Risk Assessment, 2011, SEPA

Drainage Systems

3.8 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[35].

3.9 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.

3.10 Many of our urban drainage systems are combined, carrying both stormwater and sewage in one pipe. This means that rainwater is often pumped and treated like sewage unnecessarily. 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

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

3.11 The £160 million Belfast Sewers Project 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

3.12 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.

3.13 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 and Drainage - The Way Forward

3.14 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 long-term vision is to **'manage flood risk and drainage in a sustainable manner'** to facilitate social, economic and 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

3.15 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 Floods Directive requires us to identify those at significant risk and carry out further study on these areas[36].

3.16 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 was undertaken which ensured that new plans were in place to manage flood risk across the country by 2015. The timetable for their delivery included:-

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

36 Significant flood risk in Northern Ireland has been determined through the Preliminary Flood Risk Assessment for Northern Ireland, 2011.

3.17 The process of assessment, mapping and planning is to be reviewed in 6 year cycles, co-ordinated and synchronised with the Water Framework Directive. More information on the Floods Directive implementation can be found at https://www.dardni.gov.uk/topics/rivers-and-flooding/european-floods-directive

Challenges to Flood Risk Management and Drainage

3.18 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[37].
- **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 and 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.

3.19 The Northern Ireland Climate Change Adaption Programme[38] 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 government departments to address priority flooding and climate change risks.

37 A range of water related climate change risks are highlighted in the UK Climate Change Risk Assessment, Northern Ireland Summary Report, 2012.

38 https://www.doeni.gov.uk/sites/default/files/publications/doe/ni-climate-change-adaptation-programme.pdf

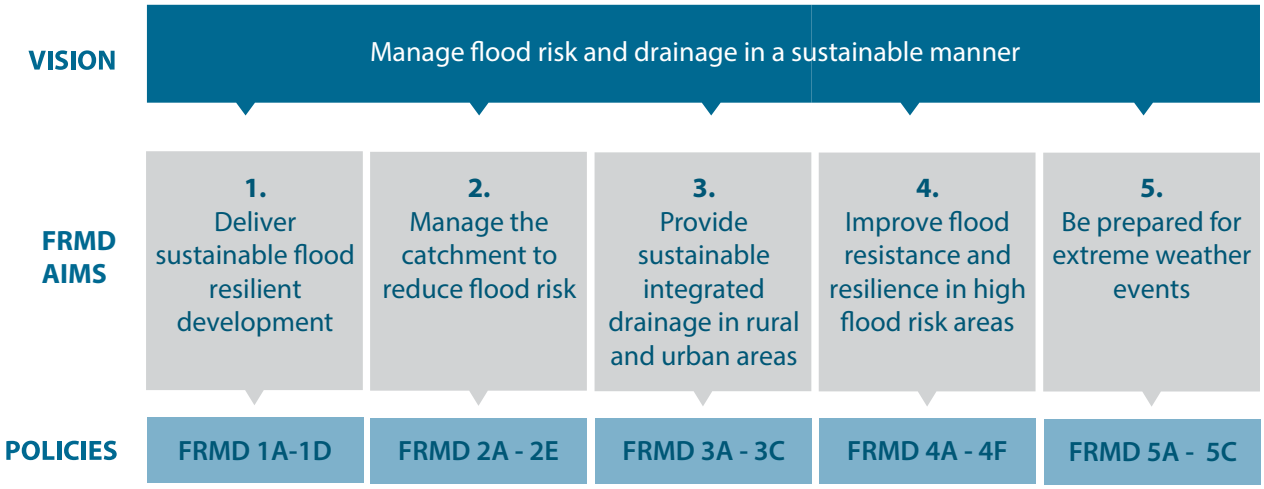
Living with Water Programme

3.20 The Northern Ireland Executive has approved the development of a Strategic Drainage Infrastructure Plan to support economic growth, protect the environment and address flood risk. This plan is required as the drainage infrastructure in many areas throughout Northern Ireland is currently inadequate to meet the requirements expected of it and the scale of the environmental and flooding problems in Belfast requires a holistic and integrated approach to future drainage provision. To deliver this, an Interdepartmental Programme called Living with Water has been established.

Flood Risk Management Strategy

3.21 To meet our obligations under the Floods Directive and meet these challenges, we need a long-term strategy for managing flood risk in Northern Ireland. The Flood Risk Management Strategy is set out in the remaining sections of this chapter and is structured around the vision and five key aims and a number of policies as shown in Figure 3.1 below.

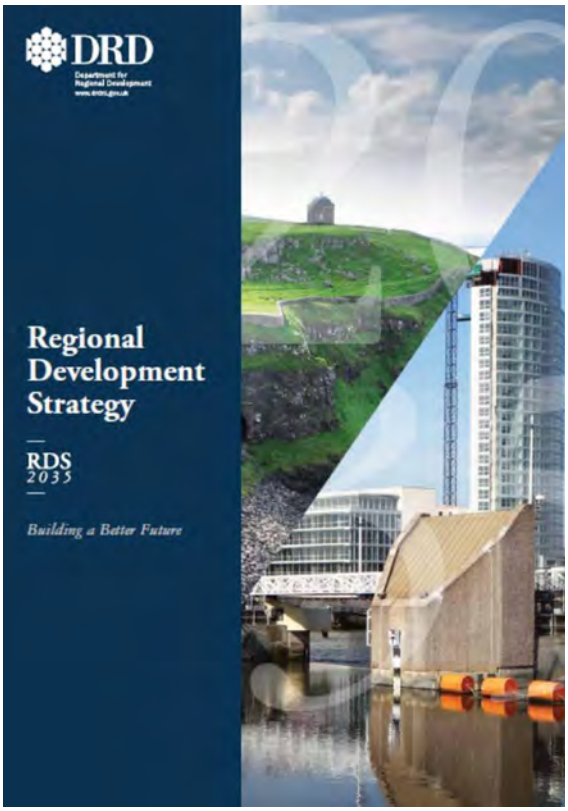
Figure 3.1 Flood Risk Management Strategy



FRMD Aim 1:

Deliver Sustainable Flood Resilient Development

3.22 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.



3.23 The Regional Development Strategy (RDS)[39] 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.

3.24 The RDS recommendations are to be implemented through the following flood risk management policies (FRMD 1A – 1D).

39 http://www.drdni.gov.uk/publications/regional-development-strategy-2035

FRMD Policy 1A

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

3.25 It is important that the planning system takes full and proper account of flood risk. This means preventing most forms of development in high 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 aim 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. Revised Planning Policy Statement 15 (PPS15[40]), was published in September 2014, following stakeholder engagement as well as Executive Committee endorsement and sets out planning policies to minimise and manage flood risk to people, property and the environment. Revised PPS15 also reflects the level of flood risk information now available through the detailed flood modelling and mapping work for the Floods Directive and requires developers to take account of this in bringing forward proposals.

3.26 In addition, DOE Planning published its Strategic Planning Policy Statement for Northern Ireland (SPPS)[41].The SPPS consolidates and improves an existing suite of planning policy statements which reflect the thrust of Revised PPS15. It provides a strategic planning framework which will assist councils in the preparation of their own Local Development Plans (LDPs). The policy aims and objectives of Revised PPS15 have been strategically reflected within the SPPS.

FRMD 1A Proposed Actions:

- Prevent inappropriate development in high flood risk areas and ensure that future development does not increase 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.

40 Revised PPS15 sets out a number of important flood risk management policies which must be taken into account in preparing development plans and in decisions on individual planning applications/appeals.

41 The draft SPPS was published for public consultation in February 2014 and was published in final form in September 2015, following consideration by the Executive Committee.

FRMD Policy 1B:

Make space for surface water management in development plans

3.27 Northern Ireland moved to a new two tier planning system in April 2015. This system provides councils with the opportunity to consider and identify suitable land use zonings when preparing their LDPs as well as developing appropriate local policies.

3.28 LDPs have an important role to play in adequately dealing with surface water movement. Policy FLD 3 'Development and Surface Water (Pluvial) Flood Risk Outside of Flood Plains' of Revised PPS15 as well as the Flood Risk subject policy within the SPPS, provides a planning policy framework to assist councils in achieving this.

3.29 These matters can be identified and considered during the consultation process between councils and relevant consultees through the LDP process. This process provides opportunities for councils to introduce mitigating measures such as Key Site Requirements (KSRs) on zoned lands to address surface water flooding.

3.30 By considering zoning suitable land through LDPs, 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.

The Craigavon Balancing Lakes

For example, the Craigavon Balancing Lakes were created in the early 1970s 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 ACTIONS:

- Engage with councils on developing guidance on how development proposals (including land use zonings in LDPs) can incorporate large surface water drainage schemes.
- Consider developing arrangements for the funding, construction and maintenance of large surface water drainage schemes in advance of development.

FRMD Policy 1C:
Sustainable Drainage Systems

3.31 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.

3.32 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.

3.33 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, hydrogeology, 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 require further consideration. This will need to be resolved to enable any such approach to be widely adopted.

Image courtesy of Civic Engineers

3.34 The aim is to make SuDS the preferred option for managing surface water in all new developments, where this is feasible. This aim is also reflected in planning policy contained in Revised PPS15 and the SPPS. If any changes to policy, legislation or organisational structures are considered necessary and agreed, these 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[42] . Until any required legislative and/or organisational changes are made, priority should be given to implementing the recommendations in the Managing Stormwater Strategy which included raising the awareness of and expertise in the design and construction of SuDs systems in Northern Ireland, promoting SuDS solutions in new developments and implementing SuDS to control runoff from new significant road schemes. This includes restricting the right to connect surface water and road drainage to public sewers, in certain circumstances.

3.35 The Water and Sewerage Services Act (Northern Ireland) 2016 includes proposals to encourage the use of SuDS and to ensure that certain SuDS systems are constructed to the appropriate standard.

FRMD 1C Proposed Actions:

- Clarify responsibilities for long-term maintenance, ownership and liability associated with SuDS.
- Implement the recommendations of the Northern Ireland Environment Agency's Managing Stormwater report.
- Consider updating Sewers for Adoption (NI) to include certain SuDS systems.

42 http://www.nienvironmentlink.org/cmsfiles/policy-hub/files/documentation/Sust/managing_stormwater_a_strategy_for_promoting_the_use_of_sustainable_drainage_systems_within_ni_september_2011.pdf

FRMD Policy 1D:

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

3.36 When drainage systems are overwhelmed during extreme rainfall, excess rainwater can cause flooding and damage to property. 'Design for Drainage 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. Consideration could be given to rainwater being channelled to nearby parkland or green spaces to soak away over time. The aim is for 'Design for Drainage Exceedance' to be incorporated into all new infrastructure.

FRMD 1D Proposed Actions:

- Develop and publish detailed Guidance on 'Design for Drainage Exceedance'.
- Existing drainage providers should review drainage standards to ensure 'Design for Drainage Exceedance' is included in all new drainage infrastructure.
- Consider if 'Design for Drainage Exceedance' should be a requirement in all new developments.

FRMD Aim 2:

Manage the Catchment to Reduce Flood Risk

3.37 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. Figure 3.2 below outlines some of the measures needed to manage flood risk within a catchment.

Figure 3.2 Sustainable Flood Risk Management Measures

The Rural Catchment	· Effective regulation of reservoir construction and maintenance · Effective reservoir inspection and maintenance · Sustainable catchment management (e.g. restore peatlands, re-forestation, etc) · Sustainable land management · Restore natural flood storage features (e.g floodplains, river overspill areas, wetlands, etc)
The Urban Catchment (Towns and 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 and re-use · Integrated urban drainage provision · Rainwater recycling and re-use

FRMD Policy 2A

Effective regulation of reservoir construction and maintenance

3.38 The preliminary flood risk assessment identified flooding from reservoirs as a potentially significant source of flood risk. There are currently 151[43] reservoirs in Northern Ireland, that are capable of holding 10,000 cubic metres or more of water and until recently there was no legislation for the regulation of reservoir safety, meaning maintenance decisions were at the discretion of the owners and operators. Given that there are around 66,000 people who currently live within reservoir inundation areas, the Reservoirs Act (Northern Ireland) 2015 was introduced to ensure this risk is managed.

3.39 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.

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

43 Of the 151 reservoirs, 76 are in public sector ownership, 65 are in private ownership and the ownership of 10 has not been established. Of the 76 in Public Ownership, Northern Ireland Water owns 48.

3.40 The Reservoirs Act (Northern Ireland) 2015 provides assurance that the flood risk from reservoirs is being appropriately managed. Revised PPS15 sets out appropriate planning policy under FLD 5: Development in Proximity of Reservoirs which contributes to reducing the risks associated with reservoir flooding.

FRMD 2A Proposed Actions:

- Government will continue to develop the necessary legislation to provide assurance to the public that this risk is being appropriately managed.

FRMD Policy 2B:

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

3.41 The aim 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 overspill 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 constructed wetlands.
- **Restoring Peatland -** the photograph 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 Actions:

- 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

3.42 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 aim is to: use SuDS measures[44],where possible, 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.

3.43 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. Consideration could be given to utilising public green spaces such as parkland and grassed areas to manage 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, in partnership with landowners, where insufficient public space is available.

FRMD 2C Proposed Actions:

- Where appropriate, publicly funded drainage schemes should include SuDS.
- Consideration could be given to utilising public green spaces (e.g. parkland) and low impact areas (e.g. car parks) 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.
- Consider developing and implementing 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.

44 Green roofs, permeable paving, swales, soak-aways, basins, wetlands, attenuation tanks.

FRMD Policy 2D:

Effective education and public awareness on sustainable drainage

3.44 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 aim is to complete an effective education and public awareness campaign on sustainable drainage.

FRMD 2D Proposed Actions:

- 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 and maintenance

3.45 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[45]. 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.

3.46 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.

45 There are approximately 385km of designated culverts in Nothern Ireland.

FRMD 2E Proposed Actions:

- 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 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

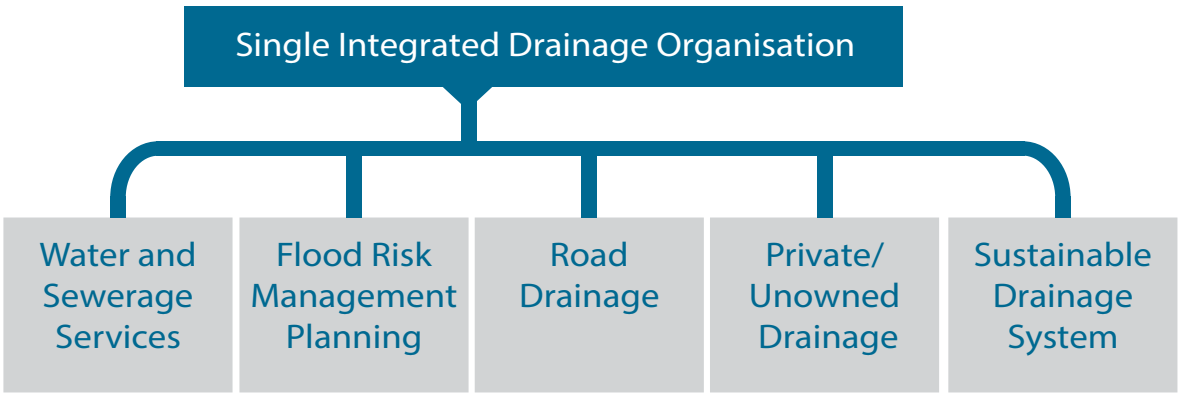
3.47 This aim is about taking a holistic, integrated approach to rural and urban drainage provision. This means ensuring that rivers, culverts, sewers, road drainage, and stormwater drainage are constructed and operated in an integrated manner to address flood risk. This will include addressing the policy,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

FRMD Policy 3A:

Establish a strategic overview for flood risk management and integrated drainage

3.48 The work of many agencies and government departments impacts on flood risk management, and within Northern Ireland no single organisation currently has responsibility for all drainage in urban and rural areas. From May 2016, the water responsibilities of DRD, DARD and DCAL will sit under the new Department for Infrastructure. However, there will still be a need for all those functions that have an impact on, or interest in, the management of water in our environment to work together. Consideration should be given to making one organisation responsible for integrated drainage across a geographical area. The restructuring of government departments may assist with this proposed aim as illustrated in the diagram below. This could include coordinating all drainage work, managing funding and directing the various drainage providers to carry out any necessary modelling and improvement work. It could also consider ownership and maintenance issues as part of its role. To be effective, it would have to work closely with catchment stakeholders, drainage authorities and local councils.

Figure 3.3 Single Integrated Drainage Organisation



Responsibilities may include areas such as:

- Urban drainage funding
- Flood risk management planning
- Integrated drainage planning/modelling
- Planning consultee
- Drainage design standards
- Managing exceedance flows
- SuDS guidance and/or approval
- Strategy for private undesignated urban drainage

3.49 A key role for the Department for Regional Development, and from May 2016, the new Department for Infrastructure will be to develop a strategic infrastructure plan to manage flood risk across Northern Ireland and inform future investment decisions.

As set out in paragraph 3.20, in July 2014, the Northern Ireland Executive agreed to set up an interdepartmental group to develop a Strategic Drainage Infrastructure Plan to support economic growth, protect the environment and address flood risk.

Therefore, a Strategic Drainage Infrastructure Programme Board (SDIPB) has been established and first met in January 2015. The board members are senior officials from DRD, DOE, DARD, DFP, NI Water, NIEA, Belfast City Council and the Strategic Investment Board. Work is underway to develop the plan. The programme of work will be delivered via a number of work packages and will initially focus on Belfast, due to the particularly urgent need for significant investment in that catchment. After the development of a Strategic Drainage Infrastructure Plan for Belfast has been initiated, work will commence on developing an 'Integrated Drainage Investment Planning Guide' and Programme for Northern Ireland.

FRMD 3A Proposed Actions:

- Establish new organisational arrangements for integrated urban surface water drainage investment planning and delivery.
- Develop a strategic drainage investment planning process and programme that can be followed to develop plans to manage flood risk across Northern Ireland and inform future investment decisions.
- Put in place clear arrangements for SuDS design approval, adoption / ownership and on-going maintenance.
- If required, make the necessary legislative changes to give effect to these arrangements.

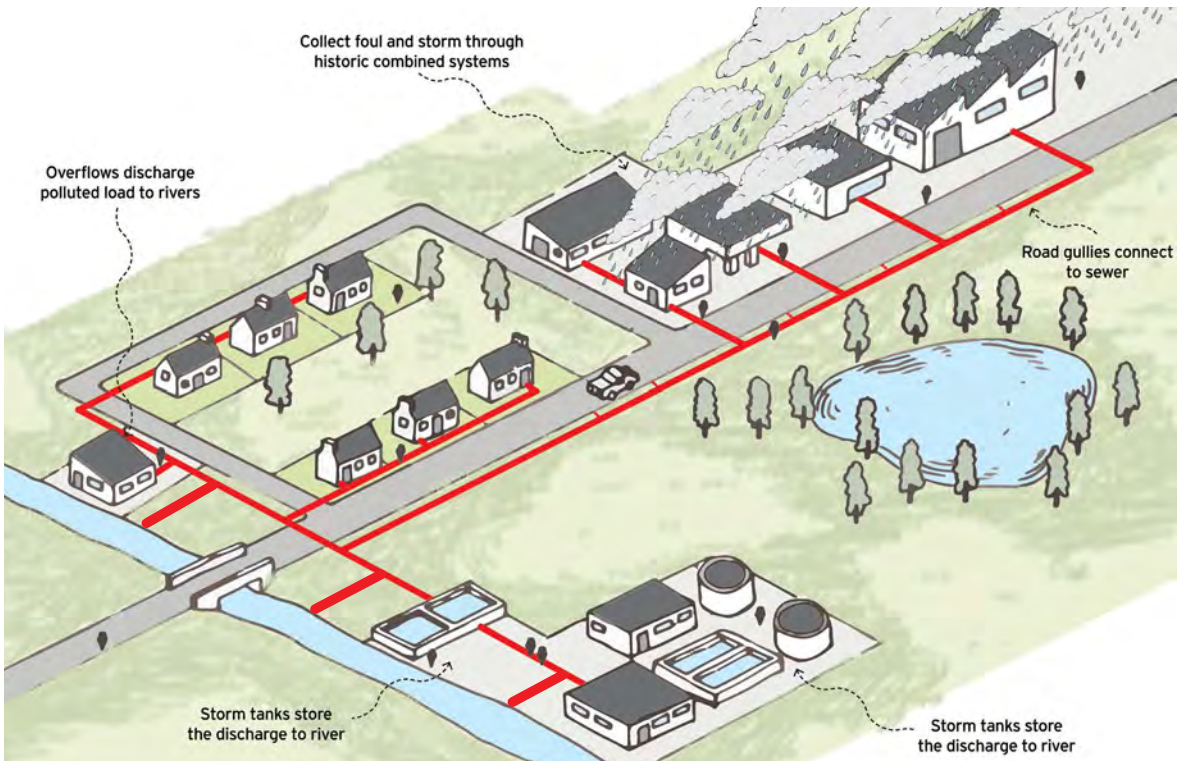
FRMD Policy 3B:

Reduce the amount of rainwater in combined sewers

3.50 Since the 1970s, 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.

3.51 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 costing £millions every year to collect, pump and treat. As previously mentioned, Combined Sewer Overflows protect the sewer system and connected properties from sewer flooding related damage. Figure 3.4 below illustrates a typical combined sewer system.

Figure 3.4 **Combined Sewer System**



3.52 Groundwater can also enter sewers through defects. This is known as infiltration and reduces the sewer capacity (illustrated in Figure 3.5 below). 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.

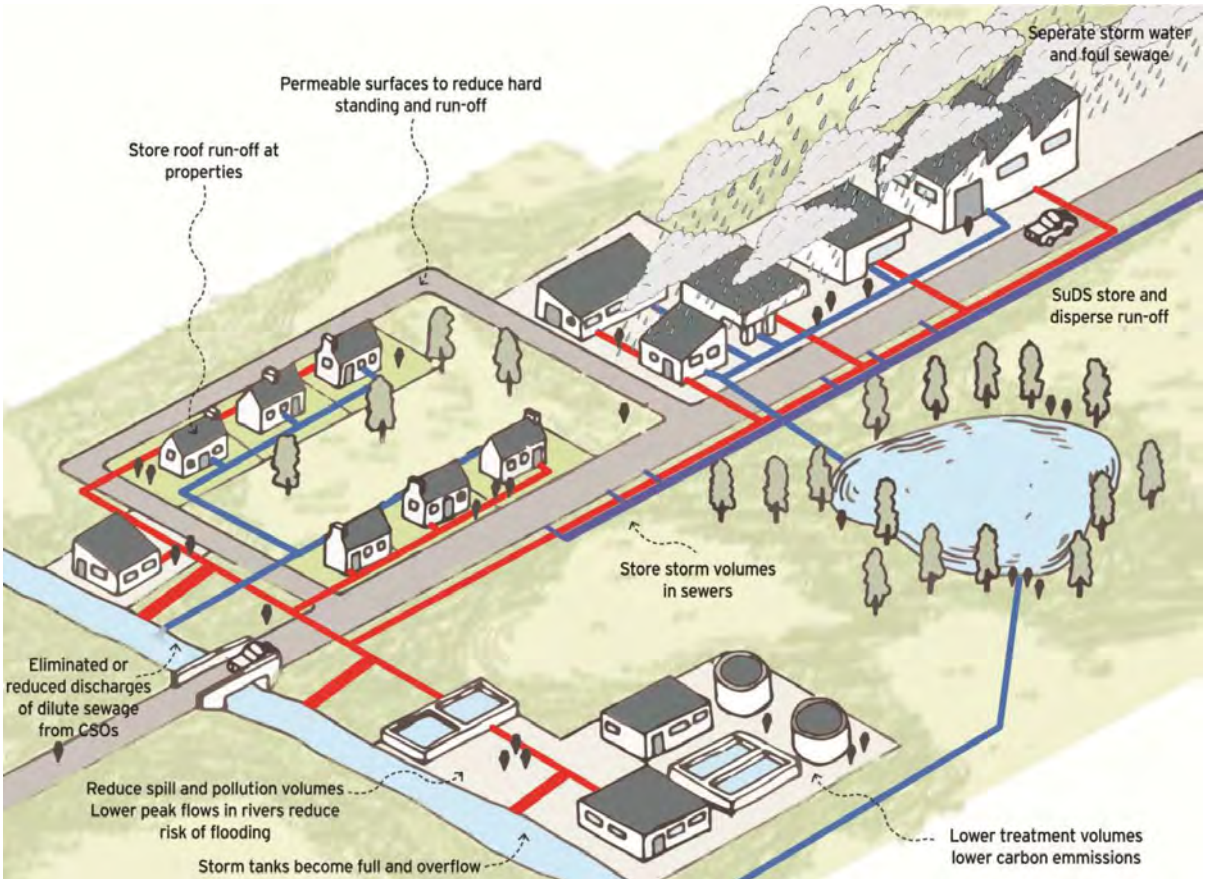
Figure 3.5 **Sewer Inflitrations**

3.53 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 where possible (FRMD Policies 1A and 1C). This is illustrated below in Figure 3.6.

FRMD 3B Proposed Actions:

- 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.

Figure 3.6 Sustainable Drainage System



FRMD Policy 3C:

Manage 'private' drainage systems to reduce the risk of flooding

3.54 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.

3.55 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 in order 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[46]. It is proposed to collect information on the number and condition of unadopted sewerage systems, with a view to determining the costs of bringing these systems up to a suitable standard for adoption by NI Water.

3.56 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.

3.57 Information on existing public and privately owned drainage systems should be used to inform development of the strategic drainage infrastructure plan to manage future flood risk in Northern Ireland referred to in FRMD Policy 3A.

FRMD 3C Proposed Actions:

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 to determine the number that need upgraded before future adoption could be considered.
- 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 drainage infrastructure plan in FRMD Policy 3A.

46 http://www.niassembly.gov.uk/globalassets/documents/reports/regional-development/nia-44-11-15.pdf

FRMD AIM 4:

Improve Flood Resistance and Resilience in High Flood Risk Areas

3.58 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

3.59 It is essential that accurate information is provided on the location and levels of flood risk across Northern Ireland. 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 Actions:

- 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 and alleviation programme

3.60 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 aim 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[47] and economic activity.

FRMD 4B Proposed Actions:

- 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.

47 Such as ancient monuments and world heritage sites.

FRMD Policy 4C:

Reduce the number of properties at risk of sewer flooding

3.61 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.

3.62 The aim 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 Actions:

- 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 NI Water 'Bag it and Bin it' education campaign.

FRMD Policy 4D:

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

3.63 Within Northern Ireland, no single 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 single organisation responsible for integrated drainage across a geographical area (FRMD Policy 3A) could be made responsible for surface water management and drainage in the longer-term, as set out in paragraph 3.48. 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.

3.64 The formation of the Flood Investment and Planning Group (FIPG) 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.

FRMD 4D Proposed Actions:

- 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)

3.65 There are many properties at risk of flooding in Northern Ireland that will not benefit from government funded community-level flood alleviation solutions 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).

3.66 To help property owners install individual property protection and ease the impact of flooding, the Homeowner Flood Protection Grant Scheme was launched on 13 January 2016. The Grant Scheme is available to the owners of residential properties that meet eligibility criteria and will generally cover 90% of the installation costs with the remaining 10% contributed by the homeowner. The cost to homeowners may typically fall within the range of £350 to £750. The grant is capped at £10,000. The Executive endorsed extending the Home Owners Flood Protection Scheme to small businesses, including farms. DARD is, subject to a favourable business case, developing a similar scheme to the Homeowner Flood Protection Grant Scheme aimed at non-domestic properties. In addition, the Executive has agreed that an Emergency Financial Assistance Scheme will be established for non-domestic properties, including small

businesses, affected by recent flooding. The details of the Scheme are to be developed by DFP and DARD.

3.67 In recent years, the Northern Ireland Executive has funded flood hardship payments of £1,000 to those households who, as a result of flooding, suffered severe inconvenience. The payment was to enable them to make their homes habitable as quickly as possible. 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 effects of each incidence of flooding, the aim 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 £5million 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.

FRMD 4E Proposed Actions:

- IPP public awareness and education campaigns should be developed and targeted at residents living in high flood risk areas.
- Extend the Homeowner Flood Protection Scheme to non-domestic properties
- Proposed development should consider the need for Individual Property Protection in areas of significant flood risk.

FRMD Policy 4F:

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

3.68 The 'Statement of Principles on Flooding and Insurance for the North of Ireland'[48] 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 Actions:

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

48 https://www.abi.org.uk/~/media/Files/Documents/Publications/Public/Migrated/Flooding/Statement%20of%20principles%20Northern%20Ireland.pdf

FRMD Aim 5:

Be Prepared for Extreme Weather Events

3.69 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 and communication systems

3.70 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.

3.71 The Northern Ireland 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 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[49] 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 aim is to publicise the FIL and the NI Direct website and complete the recommendations made in the Review to improve the effectiveness of the FIL and its supporting communication and information systems.

FRMD 5A Proposed Actions:

- Publicise the Flooding Incident Line (FIL) and the information on flooding that is available through the NI Direct website.
- Complete the recommendations in the Executive's Review of the Government Response to the Belfast Flooding Events of 27-28 June 2012 to improve the effectiveness of the FIL and its supporting communication and information systems.

49 http://www.northernireland.gov.uk/pedu-review-flood-response-june-2012.pdf

FRMD Policy 5B:

Put in place effective and reliable flood warning systems

3.72 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 policy is to introduce a flood warning system appropriate to the level of risk in Northern Ireland.

FRMD 5B Proposed Actions:

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

FRMD Policy 5C:

Effective flood emergency planning and delivery structures

3.73 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 co-ordinate the work of the various Agencies involved. This need was identified in both the Surface Water Flood Management Roles and Responsibilities Report published in 2011 and the Executive's Review of the Government Response to the Belfast Flooding Events of 27-28 June 2012.

3.74 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 aim is to support 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.

FRMD 5C Proposed Actions:

- 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 co-ordinated local response to flooding.
- Continue to support local Community Flood Forums where appropriate.

Part 4 |
Environmental Protection and Improvement

Setting the Scene

Introduction

4.1 Protecting and improving the long-term quality of the water environment is fundamental to securing high quality, safe drinking water supplies for households, business, industry and agriculture. A healthy water environment is critical. It is not just needed for drinking water but also supports recreational activities, biodiversity and the character of our countryside.

4.2 The need to protect and improve the water environment has been recognised for many years. This will not only enhance the quality of the environment but will also enable development to proceed in a sustainable manner for the benefit of future generations. To deliver such protection, there are a number of European Directives that afford special protection to identified areas that are important for nature conservation, bathing, the fishing industry and for drinking water supply. These Directives regulate wastewater discharges to waterways in order to prevent pollution. This has improved the quality of water in the environment in recent years.

4.3 To improve the quality of our inland and coastal waters and groundwater further, we need to understand the sources and impacts of pollution. We will need to consider the impact of activities such as agriculture, business and industry and the treatment of wastewater on the environment. Potential risks to water ecosystems, such as invasive alien species and the impact of climate change, will also need to be considered. We need to strike the right balance between activities that impact on the water environment and the ability of the environment to sustain these impacts over both the short and longer terms. This chapter will consider how to sustainably manage river catchments (the area drained by a watercourse) to achieve Good Ecological Status (GES) in all Northern Ireland's inland and coastal waters and groundwater and to meet the aims of the Water Framework Directive[51].

The Water Framework Directive

4.4 One of the main instruments for delivering long-term sustainability in the water environment is the Water Framework Directive (WFD). The Water Framework Directive establishes an integrated approach to the protection, improvement and sustainable use of rivers, lakes, transitional waters (estuaries), coastal waters and groundwater on a catchment basis. It adopts the 'polluter pays' principle and integrates the requirements of a number of existing European Union Directives for the protection of water from pollution. It seeks to develop a holistic approach to sustainable water use, balancing social and economic factors with the need to protect and improve our water environment.

4.5 The key aim of the Water Framework Directive is to achieve good ecological status, or good ecological potential, in all waterbodies including inland waters, coastal waters (out to one nautical mile) and groundwater, where this is technically possible and does not involve excessive cost. The Water Framework Directive is delivered (across Europe) through an integrated framework of River Basin Management Plans (RBMPs). There are three plans for Northern Ireland. These are produced by the Northern Ireland Environment Agency (NIEA) and can be viewed at https://www.doeni.gov.uk/topics/water/river-basin-management. The second cycle RBMPs which cover the period (2015-21) were published in December 2015.

4.6 The RBMPs set the framework for future regulatory decisions within each river basin. The existing condition of the water environment has to be monitored to assess its ecological status and where the status of a water body is less than 'good', a Programme of Measures must be developed to achieve specified environmental objectives. These target pollution and pressures, and identify the risk to water bodies with the aim of enabling them to attain good status. The environmental improvements must be achieved through a series of programmes of measures within specific timescales to achieve good status. The current RBMPs run until 2021. However, some areas take time to recover and the disproportionate costs of implementing certain measures necessary to improve the status of water bodies may mean that it is not possible to make the necessary improvements within this cycle. This timeframe may, therefore, be extended to 2027, where necessary.

51 Council Directive 2000/60/EC

4.7 Other European Directives include:

i Drinking Water Directive - sets quality standards for drinking water intended for human consumption. The overall objective is to protect the health of consumers and to make sure water is wholesome and clean.

ii Nitrates Directive – aims to improve water quality by protecting water against pollution caused by nutrients from agricultural sources. To meet the requirements of the Directive, a Nitrates Action Programme (NAP) was established by DARD and DOE in 2007 (and subsequently updated in 2010 and 2014) to improve water quality through more efficient and better management of farm nutrients.

iii Revised Bathing Water Directive - its principal objective is to manage bathing water quality (through monitoring and classification of bathing waters) and to provide information to the public on bathing water quality. The Directive also introduces a new classification system with more stringent water quality standards than those of the original Bathing Waters Directive.

iv Sustainable Use of Pesticides Directive - this sets rules for the sustainable use of pesticides to reduce the risks and impacts of pesticide use on human health and the environment.

v Floods Directive - this Directive requires Member States to assess which water courses and coastlines are at risk from flooding, map the flood extent and identify assets and people at risk in these areas and to take adequate and co-ordinated measures to reduce this flood risk.

vi Habitats Directive - the main aim of this Directive is to promote the maintenance of biodiversity by requiring Member States to take measures to maintain or restore natural habitats and wild species.

vii Shellfish Water Directive - this Directive aims to protect, and where necessary improve, the quality of shellfish waters in order to support shellfish life and growth and thus contribute to the high quality of shellfish products for human consumption. This Directive was repealed by the **EC Water Framework Directive**. This means the Water Framework Directive must provide at least the same level of protection to shellfish waters (which the WFD classifies as protected areas) as the Shellfish Waters Directive.

viii Groundwater Directive – this Directive provides a framework for integrated management of ground water and surface water. This Directive provides a means of setting groundwater quality standards and introduces measures to prevent or limit inputs of pollutants into groundwater. This Directive was repealed by the **EC Water Framework Directive.** This means the Water Framework Directive must provide at least the same level of protection to groundwater as the Groundwater Directive.

Environmental Strategy

The Challenge

4.8 In 2015, only 37% of our water bodies (surface waters and groundwaters) achieved good ecological status or good ecological potential. Further improvements in water quality are therefore needed. This will be a major challenge for all sectors. The methods of wastewater treatment required to meet

the quality standards needed to achieve good ecological status can contribute to increasing emissions of greenhouse gases. For example, NI Water is already the largest single consumer of electricity in Northern Ireland. This is due to the energy needed to treat and pump water and sewage. Similarly, the agricultural sector (which is the largest user of pesticides) has to fund and implement measures to reduce nutrient run-off.

4.9 To continue to improve the quality of waters in the future, it will be important to give consideration to mitigation and adaptation to climate change and the costs and benefits to each of the sectors involved in delivering improvements. Refocusing regulation and investment on more sustainable solutions may be necessary to deliver the benefits of improved water quality without compromising other environmental, social and economic objectives. It will be important not to introduce too many unnecessary additional regulatory burdens to the agricultural or water industry sectors. The new focus should be on improving the quality of inland and coastal waters and not on 'red tape'. NIEA has identified the main pressures on these waters not achieving good status to be: abstraction and flow regulation; diffuse pollution from rural and urban land, nutrient enrichment; point source pollution from sewage and industry; changes to morphology (physical habitat) and invasive alien species.

4.10 The challenge will be to address these pressures in a sustainable manner and achieve the Water Framework Directive's aim of good ecological status in all our inland and coastal waters and groundwater. If we are to overcome these pressures and continue to improve water quality by building in contamination risk resilience in the environment, a coherent long-term approach will be required. The Water Framework Directive provides the impetus and management structures to take this work forward. It will require changes to the focus of environmental regulation, and to the roles of various stakeholders involved in the management of river basin districts. Considering risks to water quality on a catchment (from source to the sea) basis and taking account of long-term factors such as climate change mitigation and adaptation and operational costs will enable improvements to be made in a sustainable manner.

Vision

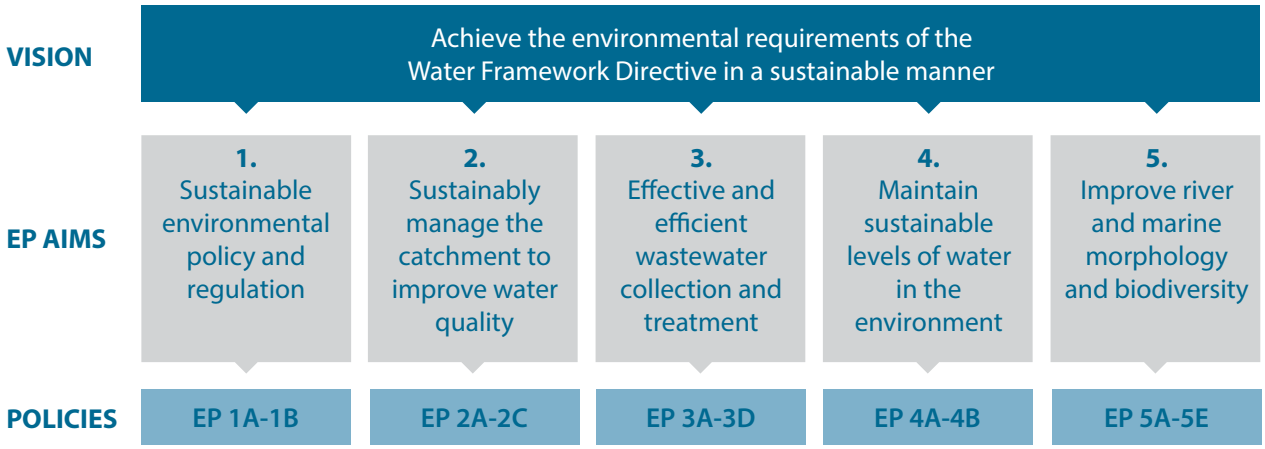
4.11 The vision is to **'achieve the environmental requirements of the Water Framework Directive in a sustainable manner'**. This is about managing the land within a river catchment to protect and improve the quality and levels of water in the environment from the source right through to the sea. The focus is on trying to avoid expensive high energy solutions by addressing issues at source. Figure 4.1 (on the next page) outlines some of the measures needed to protect and improve water within a catchment.

Figure 4.1 Sustainable Catchment Management Measures

The Rural Catchment	· Sustainable environmental regulation. · Water quality models (SIMCAT) · Local catchment management plans · Abstraction and impoundment licensing · Abstraction protection · Drinking water protected areas · Raw water monitoring · River restoration / improvement · Sustainable catchment/land management - restore peatlands and wetlands - restore heather moorlands and re-forestation · Sustainable Farm Management - Nitrates action programme - Livestock management - Nutrient management (slurry, manure and chemical fertilisers) - Sustainable pesticide practices - Integrated constructed wetlands - Energy crops filtration and riparian zones - Education and public awareness
The Urban Catchment (Towns and Cities)	· Sustainable wastewater treatment · Effective sewage spill monitoring and storage · Removing / addressing sewer mis-connections · Effective regulation of private sewers and treatment systems · Storm separation (removing storm water from combined sewers) · Infiltration reduction (reducing ground water flow into sewers) · Combined sewer separation and sustainable drainage systems · Rainwater recycling and re-use · Education and public awareness

4.12 The strategy for improving water quality in the environment is set out in the remaining sections of this chapter and is structured around this vision, five key aims and a number of proposed policies and actions as shown in Figure 4.2 below.

Figure 4.2 Water Quality Strategy



EP AIM 1:

Sustainable Environmental Policy and Regulation

4.13 This aim is about adopting a more sustainable approach to environmental regulation to reduce administrative burdens ('red tape') and promote 'low energy' natural ways of protecting and improving the quality of our inland and coastal waters and groundwater. The focus will be on reducing the energy needs of wastewater collection and treatment and encouraging improved land management practices which reduce diffuse pollution. This aim will be progressed through the following proposed environmental protection policies (EP Policies 1A - 1B).

EP Policy 1A:

Sustainable environmental policy

4.14 Over the last decade, environmental policies have helped to improve the quality of water in the environment. The Urban Waste Water Treatment Directive (UWWTD) has required government, the water industry and agricultural sectors to invest £millions to improve the quality of discharges to the environment and improve operational practices. This has seen improvements in water quality, but has also seen a large increase in the amount of energy consumption by the various sectors. Further water quality improvements are necessary, but these must be achieved without creating a legacy of high energy, high emissions infrastructure and plant.

4.15 Sustainable environmental policy is about developing and implementing policies which are socially, economically and environmentally viable. The Water Framework Directive recognises the need to balance social and economic factors with the need to protect and improve our water environment. New environmental policies must, therefore, be socially and economically viable. The financial and social costs should be taken into consideration in future environmental policy decisions such as new designations under the Urban Waste Water Treatment Directive. In addition, it is important that all opportunities are taken to maximise synergies in the implementation of the Water Framework and Floods Directives.

4.16 Policy makers should work closely with key stakeholders to develop affordable environmental policies which can be programmed into long-term investment plans (e.g. NI Water, DARD, etc). It is important to make sure all businesses and other regulated bodies/organisations are in full compliance with environmental laws. However, before any proposals are brought forward to make formal designations (under WFD or UWWTD etc), other less formal ways of protecting and improving water quality should be considered. This includes educating and working in partnership with stakeholders to encourage sustainable land management practices and wastewater collection and treatment. In addition, all policies must factor in the future implications of climate change on both quality and quantity of water sources.

EP 1A Proposed Actions:

- Financial and social costs should be taken into consideration in future environmental policy decisions to ensure total costs are weighed up against benefit to the environment

- Government should work in partnership with land owners to encourage sustainable land management practices
- Government should work in partnership with land owners to encourage sustainable wastewater collection and treatment within the catchment.
- Policy makers should work closely with key stakeholders to develop affordable environmental policies which can be programmed into investment plans.
- Greater emphasis should be given to longer-term planning, including development of shared models, to allow more time to develop and implement sustainable shared solutions which deliver benefits to a number of stakeholders.
- Coordination of future river basin management and flood risk management plans
- New policies should factor in climate change predictions on the future quality and quantity of raw water.

EP Policy 1B:

Sustainable environmental regulation

4.17 Sustainable environmental regulation is about adopting a holistic catchment based approach to protecting and improving water quality through regulation focused on the Water Framework Directive's 'polluter pays' principle. To address diffuse pollution, the focus should be on working with land owners to improve land management practices, although regulatory action may still be necessary. For the water industry there needs to be a move away from traditional high energy solutions towards natural approaches where water quality issues are addressed at source. For example, better drinking water quality might best be achieved by land management and pollution control (eg management of pesticides) to improve raw water quality, rather than extending treatment processes. Better wastewater quality might be best achieved by influencing consumer behaviour or by prohibiting the use of certain chemicals in our homes, businesses and agriculture to prevent these entering the environment. However, it is recognised that traditional approaches to help resolve environmental issues will also have to continue.

4.18 A catchment based approach to environmental regulation should be adopted to encourage: sustainable land management; low-energy wastewater treatment and sewerage solutions; sustainable consumer behaviour; and to reduce the emphasis on costly high energy solutions and regulatory action. This includes developing and maintaining robust water quality models to determine the main sources of pollution within each catchment. NIEA has developed a water quality model (SIMCAT) that will allow all significant rivers to be modelled to assess the impact of changes to discharges that may affect the flow and quality of the receiving river. In addition, modelling tools are also being developed to look at the changes in the ecology of lakes that are likely to occur as a result of changes in the pressures within the catchment that support a lake. Some catchments are greatly impacted by diffuse pollution. An understanding of how the different types of diffuse pollution impact the water environment will assist in targeting the pressures and impacts that need to be addressed. These models will provide a framework for evaluating the effects of measures adopted in catchments and facilitate development of a more effective

programme of measures to help meet requirements under the Water Framework Directive.

4.19 The River Basin Management Plans for Northern Ireland are being implemented at a local level through the development of 26 Local Management Area (LMA) Action Plans. The LMA action plans include actions on targeted agricultural advice and regulation to address diffuse pollution from agricultural sources. It is proposed to further develop this process by investigating the use of more practical, 'on-the-ground' advisory support for farmers, similar to that operated in Scotland. This promotes and encourages good agricultural practice on farms and allows for action to be taken without resorting to legal action. The development of such a system would require a change in legislation and resource in terms of agricultural advisors. The benefit would be much more proactive support for the agricultural community on environmental issues and enhanced improvement in the environment as a result.

4.20 Rivers Trusts are community-led charities established to look after a particular river or rivers and water bodies in an area. As independent organisations, working for public benefit, they are often described as having 'wet feet' and have a reputation as 'doers', delivering real actions on the ground. Rivers Trusts deliver practical river and fisheries improvement, at the catchment level, as well as helping to raise awareness of river issues and providing education to the wider public. Establishment of Rivers Trusts is a key route through which measures identified in the 3 RBMPs could be delivered. There are currently seven river trusts in Northern Ireland at Ballinderry, Lagan, Maine, Blackwater, Six-Mile Water, Erne and Strule.

Drinking Water Protected Areas (DWPAs)

4.21 The Water Framework Directive[52] (WFD) requires water bodies used for abstraction for drinking water purposes to be designated as Drinking Water Protected Areas (DWPAs) and appropriate monitoring and protection measures to be put in place. All groundwater bodies in Northern Ireland have been designated as Drinking Water Protected Areas on the basis of their existing or potential future use as a source of potable water.

EP 1B Proposed Actions:

- A flexible and collaborative approach to environmental regulation should be adopted to encourage: sustainable land management; low-energy wastewater treatment and sewerage solutions; sustainable consumer behaviour; and to reduce the emphasis on costly high energy solutions and regulatory action.
- Develop and maintain robust water quality models for rivers, lakes and groundwater to determine the main sources of pollution and inform future regulatory action.
- New policies should factor in climate change predictions on the future quality and quantity of raw water.
- Develop and maintain diffuse pollution models to enable the effects of nutrient reduction measures adopted in rural catchments to be evaluated and identify where further action is necessary to achieve good ecological status.
- Assess the need for more advisory support for farmers to help the control of diffuse pollution impacts in

52 Council Directive 2000/60/EC

Northern Ireland and the requirements to implement such a system.

- Increase capacity of River Trusts operating in Northern Ireland.
- Organise community events to encourage the local community to participate in protecting their environment and to raise awareness of issues.

EP AIM 2:

Sustainably Manage the Catchment to Improve Water Quality

4.22 This aim is about managing the catchment to prevent potential contaminants being washed or leached into surface or groundwater. This can be achieved through changes to land management practices and through improved surface water drainage. This applies to both urban and rural land and will be implemented through the following environmental protection policies (EP Policies 2A - 2C). Good land management can also provide benefits in other areas and help meet the objectives of other Directives (eg, Floods and Habitats).

EP Policy 2A:

Sustainable agricultural practices to reduce surface water run-off and leaching.

4.23 Farms cover about 70% of the total land area of Northern Ireland. Therefore, this sector has a major role in the protection and improvement of the environment, with over one million hectares used for agricultural production. There is a widespread problem with nutrient enrichment (eutrophication) of surface waters and diffuse pollution in groundwater. A large proportion of this is attributable to agriculture. This policy is about improving agricultural practices and land management to reduce nutrients being washed into the catchment. This illustration shows how farmland can be managed to keep livestock away from rivers to reduce run-off, through the innovative use if planting and fences.

Nitrates Action Programme

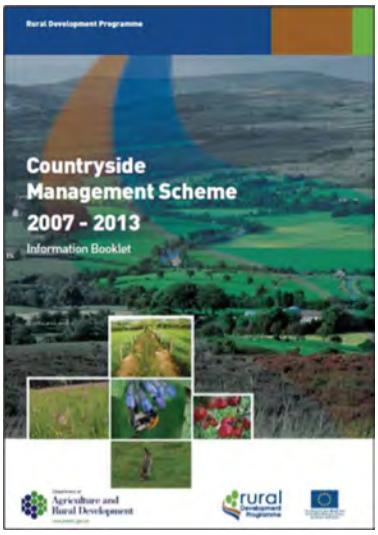
4.24 Since 2007, a comprehensive range of agricultural measures to improve water quality have been implemented through the Nitrates Action Programme (NAP)[53]. The NAP applies to all farms in Northern Ireland and the measures place controls on the management of manures and chemical fertilisers. The aim is to reduce losses of nitrogen and phosphorus to rivers, lakes and ground waters. The NAP Regulations place restrictions on when, where and how much manure and chemical fertiliser can be spread on farmland. Key measures include a 'closed period' during the winter when manure and fertilisers cannot be spread, a requirement for farms to have at least 22 weeks slurry storage capacity, limits on how much fertiliser can be spread, and record keeping requirements. To ensure compliance with the 'closed period' many farms have invested in improved slurry storage facilities.

4.25 To assist farmers with the significant cost of investment in slurry storage facilities, DARD provided capital support of some £121 million through the Farm Nutrient Management Scheme (FNMS) from 2005 to 2008. The Scheme resulted in a wide-scale upgrading of slurry storage infrastructure, with projects completed

53 Nitrates Action Programme and Phosphorus Regulations 2011-2014

on 3930 farms. This represents a total investment of over £200 million, and the FNMS was the largest capital grant scheme ever run by DARD. There has been extensive advisory support for the NAP by the College of Agricultural Food and Rural Enterprise. This includes training workshops, guidance booklets and a range of online nutrient management calculators. Since 2007, over 11,395 farmers have attended training events related to the NAP.

The NAP is reviewed every four years and revised as necessary. Following the most recent review in 2014, a revised NAP for 2015-2018[54] came into operation on 1 January 2015. In addition, the Phosphorus (Use in Agriculture) Regulations (Northern Ireland) 2006 ("the Phosphorus Regulations") were introduced in 2007 to complement the NAP, as it was recognised that phosphorus played a key role in freshwater eutrophication. These Regulations were also reviewed and remade in 2014 (The Phosphorus (Use in Agriculture) Regulations (Northern Ireland) 2014).The other main phosphorus input from agriculture is from animal feedstuffs.



54 Nitrates Action Programme Regulations (Northern Ireland) 2014

There is a voluntary agreement with the main suppliers of animal feed in the Northern Ireland Grain Trade Association which has reduced the levels of phosphorus in livestock diets.

4.26 DARD is encouraging the uptake of advanced slurry spreading systems by providing capital grant support through the Manure Efficiency Technology Scheme (METS). This equipment delivers a range of environmental and productive benefits, including more efficient use of nitrogen and phosphorus, with resulting benefits to water quality. To date, 300 advanced slurry spreading machines have been supported through METS, representing a total investment of over £7million.

Agri-environment Schemes

4.27 The agricultural sector has already made many improvements to reduce diffuse pollution from run-off and leaching from farmland. The water quality options in Agri-environment schemes are helping to protect waterways which, in turn, bring water quality benefits that will help Northern Ireland meet the requirements under the Water Framework Directive and the Nitrates Directive. Farmers in these schemes receive funding in return for preparing and implementing a nutrient and waste management plan and also have an option to manage the areas close by waterways known as riparian zones. These fenced-off riparian zones act as a buffer, reducing fertilisers and pesticides. They also reduce soil erosion and provide valuable habitat for aquatic insects. The recent Countryside Management Scheme 2007-13 (NICMS) was a voluntary scheme that provided financial support to farmers and land owners to adopt farming practices that enhance our countryside. The new agri-environment scheme under

the 2014-2020 Northern Ireland Rural Development Programme (RDP) is the Environmental Farming Scheme (EFS). The EFS aims to: improve biodiversity; improve water quality; and help to reduce the impact of climate change.

Pesticides

4.28 Pesticides often end up in raw water and drinking water sources adding extra cost to the treatment process. Reducing the levels of pesticides can be achieved through Sustainable Catchment Management. This issue is covered in more detail in the Drinking Water chapter under DW Policy 1C in Part 2 of this strategy.

Constructed Farm Wetlands

4.29 Constructed Farm Wetlands (CFWs) can benefit the environment and help the management of farm nutrients, as well as helping to mitigate flood risk. They can be designed to reduce the potential adverse impact of farm drainage on watercourses while coping with the highly variable flows under storm conditions and can also enhance habitats, biodiversity and landscapes. NIEA has developed a Design Manual for Constructed Farm Wetlands and has worked with the Department of Agriculture and Rural Development (DARD), Agri-Food and Biosciences Institute (AFBI), College of Agriculture, Food and Rural Enterprise (CAFRE) and Queens University Belfast (QUB) on a project to assess the effectiveness of wetland performance. The first approved constructed farm wetlands in Northern Ireland was established in 2004 at the CAFRE Greenmount campus farm to treat farmyard dirty water from the milking parlour and hard standings. The results of a report completed by scientists of the Agri-Food and Biosciences Institute (AFBI), monitoring the first 5 years of the CFW operation, indicated that it functioned very effectively and fully met the discharge limits set by the Northern Ireland Environment Agency. A full scientific analysis of the CFW was also published by AFBI/CAFRE which revealed the very high and sustained reduction in pollutants that was achieved reliably year on year by the CFW.

Cross Compliance - Common Agricultural Policy Reform

4.30 The aim of cross compliance is to promote sustainable agricultural practices in Europe. It is designed to encourage good farm management practices and responsible stewardship of the land, including the protection of the environment, animal health and welfare and public health. The CAP Reform Agreement requires recipients to observe certain conditions in order to qualify for payment under the Common Agricultural Policy (CAP). In November 2010, the Commission presented a paper "The CAP towards 2020" outlining proposals to reform CAP after 2013. Amongst the proposals was the "greening" of direct payments. The reforms need to be agreed and inform future agricultural policy.

EP 2A Proposed Actions:

- Continued implementation of agri-environment schemes.
- Water quality measures in the Environmental Farming Scheme will include support for riverbank fencing, riparian buffer strips and slurry spreading by low emission equipment. These measures will help to address nutrient and sediment inputs to rivers caused by agricultural activity.
- The Land Management Programme under the Northern Ireland Rural Development Programme will provide advisory support to farmers for nutrient management planning and improved land management practices.
- Review and investigate the effectiveness of constructed wetlands in the reduction of nutrient loadings to inform future policy on farm effluent treatment.
- Implementation of the Northern Ireland Nitrates Action Programme Regulations for 2015-2018 and the Phosphorus Regulations.
- Ensure that nutrient inputs from agriculture are managed in a sustainable manner to support the agricultural economy and deliver the objectives set out in the River Basin Management plans for 2027.

EP Policy 2B:

Sustainable catchment management to reduce diffuse pollution

4.31 This policy is about managing all other (non-agricultural) land within the catchment to reduce surface water run-off and nutrients/contaminants being washed or leached into rivers, lakes and underlying groundwater. This will not only help improve water quality, but will also help improve raw water quality for drinking water purposes and manage flood risk. This policy should be taken forward with DW Policy 1C (in Part 2 of this strategy) and FRMD Policy 2B (in Part 3 of this strategy).

Forestry

4.32 The UK Forestry Standard provides the policy framework to the UK Government's commitment that forests will be managed in a sustainable way. The 'Northern Ireland Forestry – Strategy for Sustainability and Growth' provides a strategy for delivery in Northern Ireland. Forest Management Plans are the basis for delivering sustainable forest management, and these plans will take account of areas subject to statutory protection and conservation objectives and /or WFD objectives. These operations will be monitored by NIEA to ensure they comply with best practice as set out in the Forestry and Water Guidelines. The multiple benefits of riparian native woodland are increasingly being recognised, and the creation of more wet woodlands, including floodplain forests, is a specific target under the UK Biodiversity Action Plan. Such schemes can assist in stabilising and managing river flows within catchments, particularly under storm conditions, to reduce riparian bank erosion and the risk of flooding.

Rural Land owners

4.33 Rural land owners should be encouraged to manage their land to reduce nutrients being washed or leached into rivers, lakes and groundwater. Possible measures include:

- Buffer strips – planted buffer strips along river banks can reduce nutrients entering raw water through run-off;
- Constructed Wetlands – low-lying land could be made into permanent wetlands and be designed to treat agricultural dirty water from nearby agricultural land;
- Restoring Peatlands – peatlands could be restored to retain more water and reduce organic matter being washed into rivers;
- Education – educating land owners to manage their land more sustainably; and
- Compliance with discharge consents - educating land owners on how best to comply with discharge consents.

Hydraulic Fracturing

4.34 Hydraulic Fracturing (also known as "fracking") involves drilling a deep hole into a bed rock layer containing natural gas and then drilling horizontal wells through the bed for 1 to 2 km. High pressure liquid containing sand, and sometimes chemicals, is pumped into the fractures to keep the fractures open, and the liquid is withdrawn to allow release of the trapped natural gas through the artificial flow pathways. The returned liquid requires treatment before disposal and consent to discharge, under the Water (Northern Ireland) Order 1999 ("the Water Order"), from NIEA. An authorisation or licence to abstract groundwater or surface water, under the Abstraction and Impoundment (Licensing) Regulations (Northern Ireland) 2006, may also be required. More research needs to be carried out into the issues associated with fracking to enable policy decisions on future proposals. NIEA and the Environmental Protection Agency in the Republic of Ireland have jointly commissioned research into the use of fracking. It is hoped that a report into the findings will be published in 2016.

Minerals Planning Permissions

4.35 In line with the rest of the UK and the Republic of Ireland, the Department of the Environment has introduced legislation through the Planning Reform (Northern Ireland) Order 2006 as amended to require the initial review of old mineral permissions. The Review of Old Mineral Permission (ROMPs) legislation, when commenced, will provide a mechanism to review existing planning conditions on old mineral planning permissions and secure improved operating and environmental standards within the quarry industry. Policy MIN 3 of 'A Planning Strategy for Rural Northern Ireland' provides for the designation of Areas of Constraint on Minerals Development in Development Plans. These plans will include a presumption against the granting of planning permission for the extraction and/or processing of minerals. Exceptions to this policy may be made where the proposed operations are short-term and the environmental implications are not significant.

EP 2B Proposed Actions:

- Rural land owners throughout the catchment should be encouraged to manage and restore land to reduce nutrients being washed or leached into the environment.
- Forest Management Plans should contain proposals for the management of riparian areas through the use of native woodland and low intensity techniques -200 ha of riparian native woodland should be planted by 2021.
- The planting of private woodlands, encouraged through forestry grant schemes, is required to meet published standards of environmental protection and practice. These should factor in flood control management through forestry planting.
- Complete research into the issues associated with fracking to enable policy decisions to be taken on future proposals.
- Following commencement of the Review of Old Mineral Permission legislation, review existing planning conditions on old mineral planning permissions to ensure they operate in an environmentally sustainable manne
- Continue to improve compliance with discharge consents regulated by NIEA.

EP Policy 2C:

Reducing diffuse pollution from surface water run-off in urban areas

4.36 During heavy rainfall, surface water is often washed quickly into rivers and culverts without any kind of treatment. Any pollutants ultimately find their way into the water environment. Sustainable Drainage Systems (SuDS) can be used to reduce both pollution and the quantity of run-off to surface waters by mimicking a more natural water cycle using a number of techniques. In addition, misconnections between the sewerage system and surface water drains may result in untreated wastewater entering the environment. This policy is about reducing diffuse pollution from surface water run-off in our towns and cities through land management and sustainable drainage systems.

A number of the flood risk management policies set out in Part 2 of this Strategy will contribute to delivery of this policy. These include:

- FRMD Policy 1C: Sustainable Drainage Systems (SuDS) are the preferred option for managing surface water in new developments, where feasible. SuDS measures can be designed to attenuate and filter surface water before returning it to the environment.
- FRMD Policy 1D: Design for drainage exceedence to be incorporated into all new drainage infrastructure. This means designing measures to safely manage excess water when proposed drainage systems are overwhelmed.

- FRMD Policy 2C: Manage urban areas to reduce surface water run-off and provide flood storage. This means using SuDS measures[55], where possible, to reduce surface water run-off in urban areas and reduce loadings on existing drains.
- FRMD Policy 2D: Effective education and public awareness on sustainable drainage. This means promoting the benefits of sustainable drainage, storm separation and infiltration reduction.

4.37 All these policies will help reduce the amount of surface water run-off into rivers in urban areas. However, it will be important for appropriate treatment or filtering to be designed into any new SuDS schemes to clean the surface water before it is returned to the environment. It will, therefore, be important for environmental quality requirements to be factored into future SuDS guidance and policies. This will involve close coordination between the flood risk management and drainage agencies and the environmental regulators.

Storage of hazardous chemicals, contaminated land and extractive industries

4.38 Under the Waste and Contaminated Land Order (Northern Ireland) 1997, there is a duty of care for the producer of commercial waste (including waste oil) to make sure it is stored and disposed of safely. NIEA has produced general guidelines to prevent pollution and promote good practice through the 'Pollution Prevention Pays' series of publications on its website. Run-off and leaching from contaminated land and extractive industries (e.g. quarries) can also impact on the quality of ground water and inland and coastal waters. The risk of pollution from poorly stored commercial waste, contaminated land and extractive industries should be managed through effective environmental regulation and enforcement.

EP 2C Proposed Actions:

- Environmental quality requirements should be factored into future guidance on sustainable drainage systems (SuDS).
- Environmental quality regulators should work closely with flood risk management and drainage agencies in the design and specification of future SuDS systems.
- The risk of pollution from badly stored commercial waste, contaminated land and extractive industries should be managed through effective regulation and enforcement.

55 Green roofs, permeable paving, swales, soak-aways, basins, wetlands, attenuation tanks.

EP AIM 3:

Effective and Efficient Wastewater Collection and Treatment

4.39 NI Water collects and treats more than 300 million litres of wastewater every day hence it is Northern Ireland's largest single consumer of electricity.

4.40 New assets and growth will see energy costs rise even further. To manage future power costs and carbon emissions, NI Water needs to deliver 'greener' services. NI Water can make a valuable contribution towards achieving government targets for energy use, greenhouse gases and renewables. The gradual introduction of more sustainable approaches to water and sewerage provision will help to manage future increases in energy consumption.

4.41 This aim is about delivering efficient and effective wastewater treatment and collection which will protect and improve the quality of receiving waters, achieve good ecological status (GES) and promote the Water Framework Directive's 'polluter pays' principle. This aim is to be implemented through the following policies (EP Policies 3A - 3D).

EP Policy 3A:

Educating consumers to prevent inappropriate items entering the sewerage network

4.42 This policy is about encouraging responsible sewerage consumer behaviour to prevent inappropriate items/ substances entering the public sewerage system.

Flushing Inappropriate Items

4.43 The public sewerage system is designed to collect sewage and wastewater from our properties and carry it to a treatment works. During heavy rainfall, combined sewerage systems are designed to overflow directly into rivers and coastal water to prevent sewer flooding in our homes. The wastewater that enters the environment is diluted by the rainwater and the high river flows preventing pollution. Consumer research carried out for water and sewerage investment shows

that consumers want more education on how to behave responsibly to help reduce inappropriate items entering the sewerage system.

4.44 Flushing inappropriate items (such as baby wipes, nappies and sanitary towels) down toilets can cause blockages in the sewerage system. This can then cause the sewers to overflow into the environment and pollute the receiving water. NI Water's 'Bag it and Bin it' education campaign highlights the importance of not flushing inappropriate items. This NI Water poster highlights the 'dirty dozen' of items that commonly cause sewer blockages. NI Water also has an extensive schools education campaign including its Water Bus. The policy is to continue school education programmes and public awareness campaigns on the importance of not flushing inappropriate items down toilets.

In 2014, NI Water's annual schools competition focused on educating children on 'How to stop internal flooding'. Other years' competitions have highlighted issues such as reservoir safety and water for health. These important messages will help to educate the consumers of the future. NI Water's annual schools competition has now been running for eight years and it will continue throughout the PC15 period.

Fats, Oils and Greases (FOG)

4.45 In addition to inappropriate items being flushed, operational problems arise from the presence and accumulation of fats, oils and greases (FOG) in the sewerage system. If poured down kitchen sinks or drains, FOG can harden and cause problems in sewers. Fat blockages may result in out of sewer flooding and odours. NI Water spends millions of pounds every year clearing blockages. For a business, blocking its own drains will result in extra costs in cleaning them up. This poster has been designed to raise education and awareness at commercial premises on correct disposal of FOG. Further advice and information is available on the NI Water website for both domestic and commercial premises. In addition, consented trade effluent discharges to sewers will have FOG limits applied, if deemed appropriate, to control the levels discharged to sewer.

Reduce Phosphates in Detergents

4.46 As already stated, there is a widespread problem with nutrient enrichment (eutrophication) of surface waters across Northern Ireland. One way to help address this issue is to reduce the amount of nutrients that enter our wastewater. Phosphorus has been employed in the formulation of detergent products for

a number of years and contributes to the phosphorus content of wastewater. Phosphorus is a major contributor to eutrophication in Northern Ireland's waters and while chemical stripping of phosphorus at wastewater treatment works is carried out at large works, it is costly and will not address pollution from households that are not connected to the public sewer. The Detergents (Amendment) Regulations 2013 allow for enforcement of the newly introduced EU Regulation (EU 259/2012). This limits the maximum quantity of phosphorus permitted in domestic laundry detergent being placed on the market to 0.5 grams of phosphorous in the recommended quantity of consumer laundry detergent to be used in the washing process. This new limit applied from 30 June 2013.

Reduce Phosphates in Drinking Water

4.47 Orthophosphoric acid has been used in Northern Ireland since 2004 to reduce dissolved lead in drinking water and to mitigate risks of lead contamination of drinking water. However, due to rising costs of this treatment and the need to reduce phosphorous in wastewater discharges, alternatives to orthophosphate treatment need to be considered. Should another more sustainable technology or method to mitigate lead plumbosolvency in drinking water become available, NI Water should investigate such options in place of orthophosphate treatment.

4.48 Other measures should be developed and implemented to reduce the amount of nutrients entering wastewater which need to be removed by end of pipe treatment solutions.

EP 3A Proposed Actions:

- Continue school education programmes and public awareness campaigns on the importance of not flushing inappropriate items down toilets and highlight how this can reduce the risk of pollution.
- Continue education programmes and public awareness campaigns on the importance of correct disposal of Fats, Oils and Greases and highlight how this can reduce the risk of pollution
- Establish partnerships with environmental stakeholders to work collaboratively to raise awareness of appropriate Fats, Oils and Greases disposal.
- Consider measures to effectively enforce the new detergent regulations to ban the sale of domestic detergents containing more than 0.5% phosphorus to reduce the amount of phosphorus entering the water environment.
- Should another more sustainable technology or method to mitigate lead plumbosolvency in drinking water become available, NI Water should investigate such options in place of orthophosphate treatment.
- Develop and introduce measures to reduce the amount of nutrients that enter the wastewater system which have to be removed through end of pipe treatment solutions, prior to discharge to the environment.

EP Policy 3B:

Efficient, effective and compliant wastewater treatment

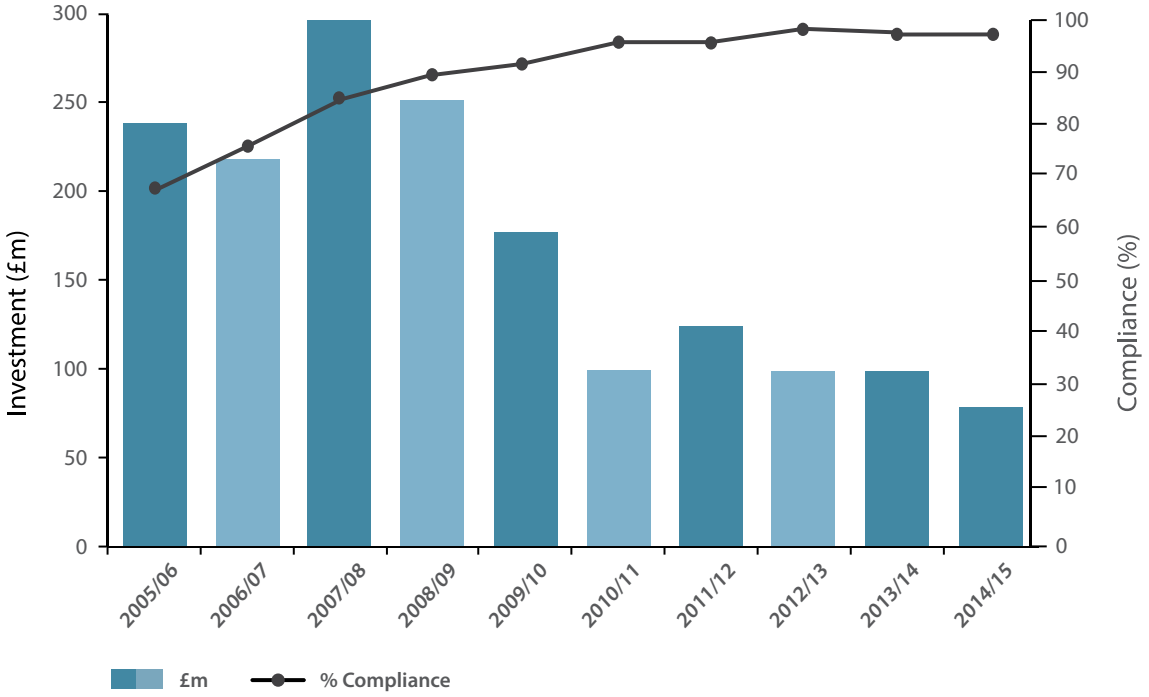
Compliant wastewater treatment

4.49 NIEA regulates the quality of wastewater discharges. It monitors and enforces NI Water's compliance with environmental requirements set out in domestic and EU legislation and produces annual reports on wastewater discharge compliance[56]. Investment in improved wastewater treatment facilities has seen compliance improve dramatically over the last eight years.

4.50 The Urban Waste Water Treatment Directive (UWWTD)[57] and Bathing Water Directive (BWD) are two of a number of Directives that determine wastewater treatment standards. Compliance with the UWWTD has increased from 67% in 2005 to over 98% in 2014 as illustrated in Figure 4.3 below. The bars and line represent investment and compliance respectively. Compliance with the BWD has also increased. Wastewater treatment must also comply with discharge standards needed to protect and improve bathing waters, shellfish waters, freshwater fish and habitats.

4.51 Climate change predictions for lower river flows, future development/growth and the need to achieve good ecological status (GES) in all our water bodies point towards the need for higher wastewater treatment standards. However, it is essential that these improvements are sustainable and not achieved at excessive cost in either carbon or financial terms. It is imperative that future increases in energy consumption are minimised.

Figure 4.3 UWWTD Compliance (% WWTW)



56 Reports can be viewed at https://www.doeni.gov.uk/articles/regulating-sewage-discharges

57 Council Directive 91/271/EEC

Trade Effluent Discharges

4.52 The control of trade effluent discharges to sewers is necessary to prevent:

- harm to the health and safety of personnel working within the sewerage system, or to those people living and/or working near the receiving sewer;
- damage to the fabric of the sewerage infrastructure;
- interference with the effective and economic treatment of the mixed wastewater at the receiving wastewater treatment works;
- the products of the wastewater treatment works having an unacceptable impact on water resources and the environment; and
- unacceptable frequency of storm sewage discharges to watercourses.

4.53 NI Water must give prior consent to discharge to the sewerage system. This consent is issued under the Water and Sewerage Services (Northern Ireland) Order 2006. NI Water operates a Trade Effluent Control and Enforcement policy to monitor and control discharges to a sewer.

Catchment Based Approach to Wastewater Treatment and Collection

4.54 A catchment based approach to wastewater collection and treatment should be adopted. This will involve consideration of the whole sewerage system and river water quality models to determine the most sustainable way of providing compliant wastewater treatment. For example, it might be more sustainable to provide an additional treatment works at a second location within the catchment rather than to upgrade existing facilities.

Two low-energy, low-maintenance treatment facilities could be better than one complex, high-energy facility. The scope of future drainage area studies for sewerage systems should be widened to incorporate the treatment facilities. The introduction of water quality models (SIMCAT) and diffuse pollution models to determine future wastewater discharge consents through EP Policy 1B will assist in delivering more sustainable wastewater treatment solutions. However, more sustainable wastewater treatment solutions which require less energy and are less expensive to operate and maintain will need to be developed and employed. Sustainable solutions require much more land than traditional solutions. The more land needed, the lower the energy requirement.

Implementing sustainable treatment technologies

4.55 Like all new technologies or processes, sustainable treatment solutions will have risks in terms of performance and reliability. To progress a long-term policy of employing more sustainable wastewater treatment solutions, environmental policy makers and economic and environmental regulators will have to accept these risks and support NI Water. To manage these risks, a number of sustainable wastewater treatment technologies should be piloted to compare the deliverability, performance, reliability and cost of different types of solution. These pilots should be used to develop a list of acceptable 'sustainable treatment' technologies to be taken forward through future wastewater treatment investment programmes.

4.56 One such technology is Short Rotation Coppice (SRC) Willow. SRC is currently grown in Northern Ireland for woody

biomass renewable energy to help reach the Department of Enterprise Trade and Investment's targets for renewable heat and electricity. Growing SRC willow can also be exploited to treat potentially polluting wastewaters, effluents and sludges as the plantation recycles the nutrients into the woody plant material which is a renewable bioenergy resource. NI Water, together with NIEA and AFBI, is currently trialling this commercial willow biofiltration technology and developing guidelines for its application. A NI Water launch in August 2013 of this commercial project at Drumkee Wastewater Treatment Works in Dungannon is due to save approximately 50% on whole life cost and approximately 1500% on whole life carbon. This application potentially represents a real solution for the large number of small rural treatment works due for upgrade over the coming years which collectively might be responsible for significant pollution outfall.

4.57 Another low energy wastewater treatment technology is Integrated Constructed Wetlands (ICW). This photo is of Stoneyford ICW in County Antrim which can treat wastewater from a 1000 population equivalent loading. Wastewater is slowly treated naturally through a series of five ponds. It takes approximately 90 days for wastewater to pass through these ponds before being discharged to a watercourse.

Integrated Constructed Wetlands at Stoneyford

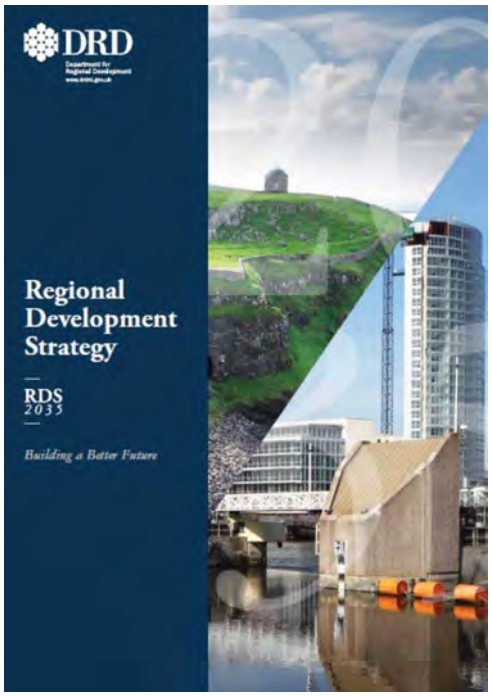
Transforming the Wastewater Asset Base

4.58 NI Water should invest with the long-term aim of gradually transforming the WWTW asset base so that it costs significantly less to operate, whilst simultaneously enhancing compliance. It is recognised that this will require a wide range of solutions to provide appropriate investment at individual WWTW sites. This will include increasing the number of WWTWs that make use of low operating cost 'sustainable' processes, such as, but not limited to, ICW and lagoon type processes. It is recognised that the development of sustainable WWTW solutions presents NI Water with investment planning and delivery challenges compared to 'conventional solutions.' They often require careful planning and more resources during the appraisal and scope development stages due to increased stakeholder engagement and the need for land purchase. There are also different types of risks to be managed.

Planning for Wastewater Collection and Treatment

4.59 The capacity of wastewater treatment facilities and sewerage systems is an increasingly important factor to be considered for future development. For example, without major investment in wastewater and sewerage infrastructure in Greater Belfast in the near future, it may not be possible to permit any new connections that will impact significantly on an already stretched infrastructure. Planning for the provision of water and sewerage infrastructure and treatment facilities is both a practical and environmental necessity for regional development.

4.60 The Regional Development Strategy (RDS)[58] provides an overarching strategic planning framework to facilitate and guide the public and private sectors. Through Regional Guidance (RG12), the RDS states that 'land-use planning should be informed by current water and sewerage infrastructure and future investment programmes'. This will involve close cooperation between planning authorities and the water industry in the preparation of local development plans.



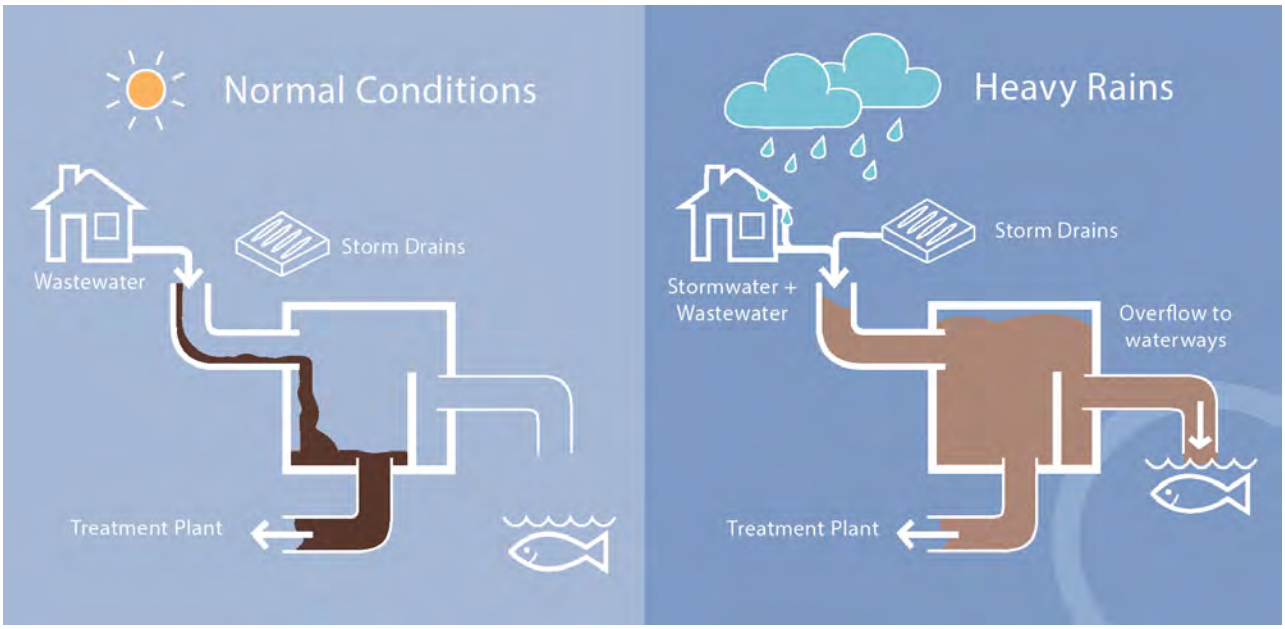
Planning policies should promote sustainable water and sewerage services by making appropriate space in development plans for water and sewerage infrastructure. Future development plans should make provision for both wastewater treatment facilities and sustainable drainage systems (FRMD Policy 1B in Part 3).

EP 3B Proposed Actions:

- Adopt a holistic catchment based approach to wastewater treatment by widening the scope of drainage area (sewer) studies and, where necessary, include recommendations for treatment facilities.
- Complete pilot sustainable wastewater treatment projects to inform a long-term investment programme with the aim of gradually transforming wastewater treatment facilities so that they cost significantly less to operate, whilst simultaneously enhancing compliance.
- Encourage environmental policy makers and economic and environmental regulators to support development and implementation of sustainable treatment solutions.
- NI Water resources for appraisal, planning, and project delivery should be aligned to deliver solutions that provide the optimum long-term benefits.
- Future development plan zonings should make provision for both wastewater treatment facilities and sustainable drainage systems (FRMD Policy 1B).
- NI Water to work with planning authorities (councils) to complete studies (during PC15) to determine locations where new/upgraded WWTWs are needed to help ensure that this does not prohibit economic growth.

58 https://www.drdni.gov.uk/publications/regional-development-strategy-2035

Figure 4.4 Combined Sewer Overflow (CSO)



EP Policy 3C:

Reduce unsatisfactory discharges from the public sewerage system

4.61 Most of the public sewerage infrastructure is combined and collects and carries both foul water (sewage and wastewater) and surface water (rainwater). When combined sewers are overloaded during intense rainfall, combined sewer overflows (CSOs) enable sewage to be discharged directly into waterways to prevent sewers backing up. The wastewater is diluted by rainwater and enters rivers with high flows. The typical composition of the dilute untreated sewage that can discharge from CSOs is more than 99.9% water and less than 0.1% solids (Ofwat, 2011). This minimises any impact on the quality of the receiving waters. CSOs act as emergency discharge valves when sewers cannot cope with the sewage and rainwater flow rate. Figure 4.4 above illustrates how CSOs operate. Without CSOs, sewage could back up into our houses and gardens causing flooding, so they are a vital part of our sewerage infrastructure. Emergency Overflows (EOs) provide a similar function to CSOs by relieving pressure in the sewerage system at pumping stations and treatment works that are overwhelmed or blocked. There are approximately 1,900 CSOs and EOs around our coastline and waterways.

4.62 CSOs and EOs perform a vital public health function in the safe management of sewerage systems under extreme weather conditions. However, due to sewerage incapacity, CSOs and EOs are increasingly coming into operation during times of low rainfall or none at all. Where these discharges start to adversely affect the environment they are classified as unsatisfactory intermittent discharges (UIDs) and must be addressed through improvements to the sewerage infrastructure. Unfortunately, there are many UIDs across the public sewerage systems. Climate change is expected to produce more extreme rainfall events at a greater frequency than those currently experienced, which will increase the likelihood of even more UIDs. In addition, future development and growth will place further pressure on the sewerage system.

The future challenge is to sustainably manage, maintain and enhance sewerage systems to facilitate development and protect/improve the quality of our inland and coastal waters. This will contribute to achieving GES in line with the WFD and improve bathing water quality to meet the revised Bathing Waters Directive.

4.63 FRMD Policy 3B in Part 3 of this Strategy aims to provide separate storm sewers and reduce sewer infiltration. This will reduce the amount of rainwater collected in combined sewers and is the most sustainable way of addressing UIDs. If there is less rainwater collected in combined sewers, CSO/EOs will need to operate less frequently. In addition, less rainwater having to be pumped and treated will reduce energy costs for NI Water. However, storm separation and reduced sewer infiltration will take many years and will not always be feasible. It is, therefore, important that sewerage systems are effectively managed to prevent pollution from UIDs whilst facilitating growth. This is recognised in the Marine Conservation Society's (MCS) CSO Pollution Policy and Position Paper[59] which makes recommendations on the management of CSOs. Priority should be given to putting efficient and effective CSO/EO spill monitoring arrangements in place to help prevent pollution incidents in line with the MCS's recommendations. Priority should be given to installing CSO/EO monitoring at designated bathing and shellfish waters where spills are limited to 3 and 10 times per season respectively.

4.64 It is also recognised that, in addition to a long-term programme of sewer separation and infiltration reduction, conventional sewer storage solutions, such as underground tanks, may still have to be implemented in the short term to address UIDs. However, these solutions should only be progressed if storm separation and/or infiltration reduction is not viable. Consideration should be given to deploying sustainable treatment solutions (e.g. reed beds, lagoons) to manage wastewater from overflows before it is discharged into the environment.

EP 3C Proposed Actions:

- Develop and implement a long-term investment programme focused on addressing unsatisfactory intermittent discharges through storm separation and infiltration reduction (FRMD Policy 3B) facilitating development and contributing to achieving good ecological status in inland and coastal waters.
- Conventional sewer storage solutions will only be implemented where storm separation and/or infiltration reduction are not viable, or provide an incomplete solution.
- Consideration should be given to deploying sustainable treatment solutions (e.g. reed beds) to treat problematic overflows before discharge into the environment.
- Implement a long-term programme to provide monitoring of Combined Sewer Overflows / Emergency Overflows prioritised initially on designated bathing and shellfish waters.
- Restrict the 'right to connect' surface water drains to the public sewer network in certain circumstances.

59 http://www.mcsuk.org/downloads/pollution/CSO%20policy.pdf

EP Policy 3D:

Sustainable and compliant private sewers and treatment systems

Private Septic Tanks

4.65 The impact of septic tank discharges or on-site wastewater treatment systems (OWWTS) on the aquatic environment in Northern Ireland is an issue that has received significant attention over the last 20 years. The key control for ensuring the protection of our waters is the Water Order discharge consenting process. This process operates alongside the planning system and ensures that site specific factors are taken into account when determining the appropriate method of sewage treatment and disposal. NIEA carried out a review of the discharge consenting process, in respect of OWWTS, in 2011, which involved research into current best regulatory practice across the UK and Ireland. Following a period of public consultation, a revised application process, and accompanying technical guidance, were launched in January 2012. This has resulted in a more consistent regulatory approach and provides guidance for a range of situations.

Unadopted/private sewers and treatment facilities

4.66 There are many private sewerage systems on residential and large commercial sites (e.g. shopping centres) which are not managed or maintained by NI Water. It is important that these systems are effectively regulated to ensure that they do not pose any environmental or health risks. It is equally important to ensure that private sewerage systems in any future developments are constructed to appropriate standards. Unfortunately, this is not the case for many recent residential developments where residents have been left with partially completed sewers (and/or OWWTS), after developers have gone out of business. Many of these systems have not been constructed to appropriate standards and pose a pollution threat to the environment. This issue was examined by the Committee for Regional Development through its Inquiry[60] into Unadopted Roads in 2012. The Committee made a number of recommendations aimed at improving the road/sewer bond process to protect prospective home buyers and ensuring private sewerage systems are constructed to appropriate standards in the future. Priority should be given to progressing the Committee's aims of ensuring future homebuyers can purchase homes in the knowledge that the sewerage systems (and/or OWWTS) are constructed to appropriate standards.

4.67 However, a legacy of partially completed sewers remains. FRMD Policy 3C in Part 3 of this Strategy includes a proposal to collect information on all unadopted residential sewerage systems constructed since 2007 with a view to determining the costs of bringing these systems up to a suitable standard for future adoption. This should be used to inform the development of a policy on managing the environmental risks posed by private sewerage systems.

Sewerage Misconnections

4.68 Sewerage systems are a complex arrangement of old and new storm, foul and combined sewers. When mistakes are made in the connection of pipes around our homes, this can result in foul wastewater from washing machines,

60 http://www.niassembly.gov.uk/globalassets/documents/reports/regional-development/nia-44-11-15.pdf

sinks, baths and toilets being sent directly to local rivers instead of to a sewage treatment works. Where foul sewers are connected to the storm system, this can lead to pollution of rivers. Where storm water is connected into a foul sewer, this can cause the foul sewer to back up and overflow. This is because foul sewers are not designed to carry large volumes of storm water.

4.69 Although development control reduces the risk of misconnections occurring in new developments, older systems still exist, and connection errors and unauthorised connections can occur. These can be difficult to locate, and solving misconnection problems can involve action by householders, Councils, NI Water and the NIEA. It is important for everyone to tackle the problem of misconnections to reduce the risk of pollution and out-of-sewer flooding. This will involve various parts of government coordinating their efforts to track down and repair the causes of local problems.

EP 3D Proposed Actions:

- Ensure the construction, maintenance and operation of private sewerage systems (PSS) and treatment facilities are effectively regulated to ensure that they do not pose any environmental or health risks.
- Put in place arrangements to ensure prospective homebuyers will have assurance that the sewerage systems (and on-site wastewater treatment systems) are constructed to appropriate standards.
- Develop and implement a strategy for identifying and addressing misconnections between the sewerage system and storm water drains.

EP AIM 4:

Maintain Sustainable Levels of Water in the Environment

4.70 With future population growth and development, there will continue to be a need to abstract large amounts of water for drinking water purposes and for business and industry. This aim is about managing future water abstractions to maintain sustainable levels of water in the environment to achieve GES. This aim should be read in conjunction with DW Aim 2 and DW Policies 2B-2E which focus on managing future drinking water demand.

EP Policy 4A:

Protect water resources through effective regulation and enforcement

Abstraction and Impoundment Controls

4.71 The Water Abstraction and Impoundment (Licensing) Regulations (Northern Ireland) 2006[61] provide controls on water abstractions and impoundments in Northern Ireland. All significant operators who have a licence to abstract from surface water or groundwater under the regulations are required to have monitoring systems in place or, with respect to hydro operations, to produce a monitoring plan three months prior to commencement of the operation. NIEA needs accurate information on abstractions to carry out its duties[62] and meet the WFD's objectives on promoting sustainable water use, preventing deterioration of the water environment and protecting/enhancing the water environment. NIEA is planning to carry out a review of abstraction licences and introduce flow monitoring at all drinking water sources which are not meeting high or good water resource flow standards in line with the WFD. It is also proposed to make continuous flow monitoring a condition of all new significant abstraction proposals.

Sustainable Abstraction

4.72 It is important that we only abstract the water we need. Through DW Policy 2C, NI Water will put in place effective systems and processes to avoid over abstraction. Consideration should also be given to when water is abstracted. Abstraction volumes increase as drinking water demand increases. For example, abstraction volumes reduce significantly at night time. However, it might be more sustainable to continue to take an even amount of water from the environment and store it (through impoundments, etc) for drinking water abstraction. Similarly, opportunity could be taken to abstract more water when river flows are higher. Consideration should be given to how water abstractions can be more sustainably managed throughout the day and throughout the year.

Relationship between groundwater and surface waters

4.73 For some surface waters, abstraction of groundwater within the catchment, which reduces the base flow to the surface water, can contribute to failing objectives. To better understand the relationship between groundwater and surface waters, an integrated long-term monitoring programme is required that supports

61 SR 2006/482

62 Duties under the Water Environment (Water Framework Directive) Regulations (Northern Ireland) 2003

water level reporting and the impact of groundwater abstractions. Specific research projects are required at sites in Northern Ireland.

Assessing the ecological impacts of changes in hydrology

4.74 It is important to be able to predict changes in ecological impacts on waterways as a result of changes in hydrology due to abstraction and/or changes in flow. Biological tools should, therefore, be developed to assess the ecological impacts of changes in hydrology as a result of abstraction and flow regulation. The project should feed into the review of flow standards by the UK Technical Advisory Group which will influence how large impounding works are managed, particularly hydroelectric schemes. However, there should be strong evidence of need in individual cases and an assessment of the costs and benefits in any decision made including compensation flows in dry weather and associated costs.

Hydropower

4.75 Hydropower is a growing sector for the sustainable generation of electricity. Its development needs to be managed in a manner that provides effective and integrated environmental protection/regulation as well as providing a sustainable energy source for the future. NIEA is currently developing operational policies in relation to hydro-development that seek to minimise the risk to fisheries, biodiversity and other water users while providing a viable and economic generating resource.

EP 4A Proposed Actions:

- Review the effectiveness of the drinking water abstraction processes to ensure that only water needed for supply and/or treatment is taken from the environment.
- Complete a review of abstraction licences and introduce flow monitoring at all drinking water sources which are not meeting high or good water resource flow standards in line with the Water Framework Directive.
- Make continuous flow monitoring a condition of all new significant abstraction proposals.
- Consideration should be given to how water abstractions can be more sustainably managed throughout the day and throughout the year.
- Complete research projects to gain an improved understanding of the relationship between groundwater and surface waters so that neither type of water body causes a deterioration in each other or compromises their Water Framework Directive objectives
- Develop biological tools which can be used to assess the ecological impacts of changes in hydrology as a result of abstraction and flow regulation.
- Ensure that hydropower schemes are designed and operated in a manner that provides renewable energy, in accordance with the NI Assembly and UK Government targets, in a sustainable manner that supports good ecological status or potential and has no significant adverse impact on the environment
- Complete and implement guidance for run-of-river Hydropower Schemes to assist in achieving the objectives of the River Basin Management Plans for 2021.

EP Policy 4B:

Effective water resource and drought management

4.76 Through DW Policy 2B, NI Water will develop a revised Water Resource and Supply Resilience Plan to identify the long-term water resource management, resilience and security of supply investment needs. This plan will incorporate drought planning requirements and focus on promoting sustainable water use in line with the WFD by including measures to reduce water demand to achieve the long-term consumption target of 130 l/h/day. The plan will also identify adaptation and resilience measures in response to climate change predictions and take account of NIEA's proposed review of water abstraction and impoundment licences.

4.77 Drought orders[63] can be made to put measures in place either to protect the environment or to safeguard drinking water supplies during periods of exceptionally low rainfall. To date, no such orders have been made, but with climate change predictions, drought orders may be needed in the future. It is, therefore, important that clear guidance is published on the drought order application process.

DW 4B proposed Actions:

- Guidance should be developed on the process for making drought orders under Article 137 of the Water and Sewerage Services (Northern Ireland) Order 2006.

63 DRD can make drought orders under Article 137 of the Water and Sewerage Services (Northern Ireland) Order 2006

EP AIM 5:

Improve River and Coastal Water Morphology and Biodiversity

4.78 The Water Framework Directive's aim is to achieve good ecological status (GES) in all inland coastal and ground waters. GES is not just about water quality. It covers biological quality (fish, invertebrates, aquatic flora, etc) and hydromorphological quality such as river bank structure, river continuity or substrate of the river bed. Ecosystem services (an interdependent system of living things including people, animals and plants in their physical environment) also deliver important benefits in this area and contribute to making human life both possible and worth living. This aim is about protecting and improving morphology and biodiversity.

EP Policy 5A:

Protect and improve freshwater morphology

4.79 Many of our rivers and lakes have a history of engineering interventions which have played an important role in the growth of the Northern Ireland economy. A number of our waterways have been physically modified to supply water, accommodate drainage schemes, provide flood protection, and support navigational and recreational purposes. These changes to the physical water environment have resulted in the straightening and deepening of rivers, lowering of lake water levels, reinforcement of banks, culverting of rivers and the installation of bridges, weirs and impoundments. Such modifications affect the ecology and the provision of desirable water habitat. River restoration work carried out by DARD, DCAL, Loughs Agency and angling clubs has improved the physical habitat of a number of our rivers. There is, therefore, a need to develop a prioritised restoration work programme for water bodies that are impacted by morphological alterations. However, in some areas, rivers and lakes have been altered to such a degree that attempting to return them to their natural condition would now be economically or technically unfeasible. Such water bodies are designated as Heavily Modified Water Bodies (HMWBs) under the WFD. These designated water bodies require mitigation measures to be put in place to maximise their ecological potential as opposed to 'restoring' the natural condition. The WFD requires Member States to ensure that the physical condition of surface waters supports good ecological potential. There is a need to produce guidance to support this process and also to assess the feasibility and effectiveness of restoration measures.

EP 5A Proposed Actions:

- Maintain a guidance handbook to supplement legislation offering control over physical modifications
- Assess the technical feasibility and cost-effectiveness of restoration measures through the development of the European project RESTORE (Rivers: Engaging Supporting and Transferring Knowledge for Restoration in Europe).
- Implement river restoration measures through a prioritised restoration work programme for water bodies showing morphological impact
- Develop an inventory of schemes completed or planned by DCAL, DARD and Loughs Agency to assist in targeting future investigations

EP Policy 5B:

Protect and improve coastal water morphology

4.80 The Marine and Coastal Access Act 2009 covers the licensing of all deposits and construction in marine waters. Marine morphology issues are controlled under these licensing arrangements. In relation to dredging, to maintain navigational channels, there is a need to develop a protocol for maintenance dredging to provide assistance to commercial port authorities and regulators approving such activities and to promote 'best practice'. The protocol should enable a range of environmental European Directives and associated issues to be dealt with in a streamlined and proportionate manner.

EP 5B Proposed Actions:

- Develop and implement measures in the marine environment to achieve good ecological status by 2020.
- Develop a protocol setting out 'best practice' for maintenance dredging activities to assist Port Authorities and Regulators to fulfil their statutory obligations and to ensure compliance with the Habitats, Birds and Water Framework Directives.

EP Policy 5C:

Effective management and control of alien species

4.81 Many non-native (exotic/alien) species have been intentionally or unintentionally introduced into Northern Ireland from around the world. Many of these non-native species are important to our economy and society, in particular, agriculture and garden plants. Most of the non-native species of plants and animals are valued aesthetically and commercially and pose no threat to native species. However, some non-native species become 'invasive' and out-compete our native plants and animals. Their spread poses a threat to the native biodiversity and ecology and can have a wide range of economic and social impacts. Invasive alien species are widely recognised as the second biggest threat to biodiversity after habitat destruction.

Tackling invasive alien species is complex due to the range of environmental, social, economic, political and technological factors involved and the interactions between them.

EP 5C Proposed Actions:

- Manage alien species introductions and control, and contain or eradicate existing alien species through the implementation of a co-ordinated management framework across the whole of the island of Ireland.
- Help deliver the aims and objectives of the Invasive Alien Species Strategy for Northern Ireland to minimise the risk of invasive alien species to the economy, environment and society.
- The strategy should also have a key objective of contributing to the Convention on Biological Diversity and EU target to halt the loss of biodiversity and the degradation of ecosystem services by 2020 and beyond.
- Develop risk assessments and management plans for invasive alien species that are established or likely to become established.
- Target eradication of alien species at catchment scale for Giant Hogweed, Japanese Knotweed and Spartina Anglica.

EP Policy 5D:

Sustainable commercial and recreational fisheries

4.82 Many fish species in inland and transitional (estuarine) waters support commercial and recreational fisheries. The commercial fisheries for salmon, trout, eels and pollan have declined in recent years and although angling remains a major participation sport in Northern Ireland, catches are becoming more variable. Species most sensitive to impacts on their habitats, such as salmon and char, are currently under pressure and there is a major decline in eel recruitment to the coast that is a real concern. The estuaries support important nursery and over-wintering habitats for fish and the sea loughs provide economically valuable areas for shellfisheries such as mussel and native oysters.

4.83 To address the decline in Atlantic Salmon, an Atlantic Salmon Management Strategy for Northern Ireland has been developed to meet the objectives of the North Atlantic Salmon Conservation Organisation (NASCO). This includes work to ensure sufficient adult salmon are spawning and hence maximise the run of smolts to sea from freshwater nurseries. The European Eel Regulation aims to establish measures for the recovery of the European eel stocks. Work is on-going in conjunction with other UK departments, Natural Resources in Ireland and the commercial eel industry to meet the requirements of this Regulation. DCAL is seeking to arrive at a balance between a permitted level of commercial fishing and the conservation of the species to ensure both a sustainable eel stock and a sustainable industry in the future.

EP 5D Proposed Actions:

- Develop a programme of salmonid fish habitat improvement work in conjunction with fishery organisations.
- Develop robust protocols for considering new shellfish designations / aquaculture licences which take account of compliance costs.

EP Policy 5E:

Protect and improve biodiversity

4.84 Northern Ireland has a rich natural biodiversity which is essential to maintain a healthy environment and sustain life through biological processes which play an important role in supporting clean air, water and food chains, which in turn contribute to human health and well-being. Protecting biodiversity is a core component of sustainable development and underpins important economic sectors such as agriculture and forestry, commercial fishing and tourism. The world is losing biodiversity at an increasing rate because of human activity such as development, changing land use practices, invasive alien species and climate change. The UK is a signatory to the Convention on Biological Diversity (CBD) and, in response, a Northern Ireland Biodiversity Strategy was published in 2002. A new Biodiversity Strategy for Northern Ireland was published in 2015. This latest strategy takes account of the CBD strategic goals and targets aimed at halting biodiversity loss. The Wildlife and Natural Environment Act (Northern Ireland) 2011 introduced a Biodiversity Duty for all public bodies. It includes a requirement to maintain lists of the species of flora and fauna and types of habitat of principal importance in conserving biodiversity which will aid the delivery of the Northern Ireland

Biodiversity Strategy. Lists and information have been published on 51 Northern Ireland priority habitats and 481 Northern Ireland priority species requiring conservation action.

4.85 Northern Ireland has a number of designated habitats and species of international, national and local importance that are important cornerstones for protecting biodiversity. These include Special Areas of Conservation (SACs) under the Habitats Directive, Special Protection Areas (SPAs) under the Birds Directive and Areas of Special Scientific Interest (ASSIs). These all host features which are required to achieve a favourable condition. The long-term aim is to halt the loss of species and habitats in Northern Ireland by 2020. Measures need to be put in place to address the decline of biodiversity particularly in relation to designated sites, priority habitats and priority species.

Ecosystems Services

4.86 There has been an increasing focus on wide-ranging and essential services that our native biodiversity provides. These services vary between different types of terrestrial or marine, inland or coastal, rural or urban habitats. NI Water is an important provider and user of ecosystem services in Northern Ireland. Opportunities to improve biodiversity should be factored into all future schemes within catchments. This includes NI Water's proposed Sustainable Catchment Area Management Plan NI (SCAMP NI) (DW Policy 1C in Part 2 of this Strategy) and sustainable land management measures to address diffuse pollution (EP Policies 2A-2B) and to improve flood risk management (FRMD Policies 2B-2C in Part 3 of this Strategy). Our long-term aim is to ensure sustainable management of ecosystems and delivery of their services.

EP 5E proposed Actions:

- To develop a more integrated ecosystem approach to terrestrial, marine and freshwater conservation to help safeguard ecosystem services.
- To address key actions for Northern Ireland's priority habitats and Northern Ireland's priority species.
- To contribute to the achievement of a favourable condition on designated sites.
- By 2020, measures should be in place to conserve the freshwater pearl mussel and other water dependant protected species.
- Halve the rate of loss of water dependant natural habitats and halt their degradation by 2020.
- Promote the eradication of existing alien species through stakeholder engagement and the implementation of a co-ordinated management framework
- Promote involvement of farmers in the Northern Ireland Countryside Management Scheme as part of the River Basin Management Plan implementation.
- Promote policies to help ensure long-term sustainable management of ecosystems and delivery of their services.

Part 5 |
Water and Sewerage Services

Setting the Scene

Introduction

5.1 The supply of clean, healthy drinking water and the effective treatment of our wastewater are essential for public health, the economy and the environment. These services must meet the varied needs of all customers including agriculture, business, industry and households without impacting adversely on the environment. The provision of water and sewerage services currently costs around £370 million[64] every year.

Governance and Regulation

5.2 The current regulatory and financial framework for the water industry was established in 2007 by the Water and Sewerage Services (Northern Ireland) Order 2006[65]. This included the creation of NI Water as a government owned water and sewerage company to be run on a commercial basis and subject to independent environmental and economic regulation. The Department for Regional Development is responsible for setting the policy and legislative framework for water and sewerage services.

64 As identified in PC15 revenue requirement

65 2006 No 3336 (N.I. 21)

5.3 NI Water receives around 25% of its income directly through non-domestic charges to customers such as agriculture, industry and business. DRD currently pays an annual subsidy of around £280 million to NI Water on behalf of domestic consumers to meet the Executive's commitment not to introduce household charges during the current Programme for Government (2011-16). Because NI Water is majority publicly funded, it is classified as a Non-Departmental Public Body (NDPB) and is accountable for its expenditure to Ministers, the Executive and the Assembly just as if it was part of DRD. At the same time, NI Water is a government owned company (GoCo) and a 'regulated utility' which is subject to economic regulation by the Utility Regulator (the economic and customer service regulator). As a GoCo, NI Water is also subject to corporate code as a public limited company (PLC). The Drinking Water Inspectorate (DWI) and the Northern Ireland Environment Agency (NIEA) regulate compliance with EU quality standards for drinking water and wastewater discharges. The Consumer Council protects and represents consumer interests.

Water Industry Price Control Process

5.4 NI Water's revenue requirements and performance targets are established through a price control (PC) process. Each PC process begins with customer consultation to obtain customers' views. This informs the Ministerial Social and Environmental Guidance which sets out strategic water and sewerage priorities for the period. NI Water sets out how it will deliver these priorities in a business plan. This plan is assessed by the Regulator to determine NI Water's revenue requirement and performance targets for the period. This forms the basis for NI Water's annual scheme of water and sewerage charges.

5.5 The first two price controls (PC10 and PC13) covered the 5 year 2010-15 period. The current price control PC15 covers a 6 year period (2015-21) to facilitate longer investment planning. Social and Environmental Guidance for PC15 can be viewed at: https://www.drdni.gov.uk/publications/social-and-environmental-guidance-water-and-sewerage-services-2015-2021

Challenges to Service Delivery

5.6 Significant amounts of electricity and chemicals are used in the treatment process in order to produce high quality drinking water. Only 4% of treated water is consumed. The majority is used for other purposes (toilets and showers). If we reduce the amount of water we use, our carbon footprint will be smaller, less damage will be caused to the environment through the use of chemicals and treatment and electricity costs will be reduced. There are many challenges to continuing to provide safe, sufficient supplies of drinking water. These include:

Funding and Affordability	Our water and sewerage services currently cost around £370m per yr[66]. These costs are likely to increase with population growth, development and energy price rises. Customers' bills[67] will have to cover these costs but they will need to be affordable.
Governance and Regulation	Operating within the confines of current and future systems of governance and regulation.
Maintenance	Maintaining a growing and ageing water and sewerage asset and infrastructure base.
Environmental Compliance	We continue to enjoy clean safe drinking water which achieves high levels of compliance with the regulatory standards. Similarly, compliance with wastewater treatment standards continues to improve. However, sustaining these high compliance levels will continue to require significant investment to maintain and improve existing water and sewerage infrastructure and assets.
Regional Development and Growth	While the quantity of water available for human use is largely sufficient to meet our needs now, this may not be the case in future. Water and sewerage infrastructure and assets need to accommodate future development, population growth and changing demographics.
Carbon and Green House Gas Emissions	Maintaining a pressurised water system and providing appropriate wastewater collection and treatment requires large amounts of energy. This energy use is likely to continue rising with future development and growth. This will impact on future customers' bills.
Protecting the Environment	Abstracting large amounts of water can lead to low river flows and place natural ecosystems at risk. It is, therefore, important that future water demand is managed effectively to protect water resources. It is also essential that effective wastewater collection and treatment systems are in place to protect our inland and coastal waters.
Climate Change and Resilience	Maintaining and operating extensive water distribution and sewerage systems is a difficult task during normal climatic conditions but becomes extremely challenging during extreme weather. This was illustrated during the major water supply issues that resulted from the freeze-thaw event in December 2010. Climate change predictions indicate that the frequency of extreme weather events is likely to increase. It is, therefore, important that measures are put in place to preserve service delivery during extreme weather events.

66 As identified in PC15 revenue requirement
67 Domestic water and sewerage bills are currently subsidised by the NI Executive.

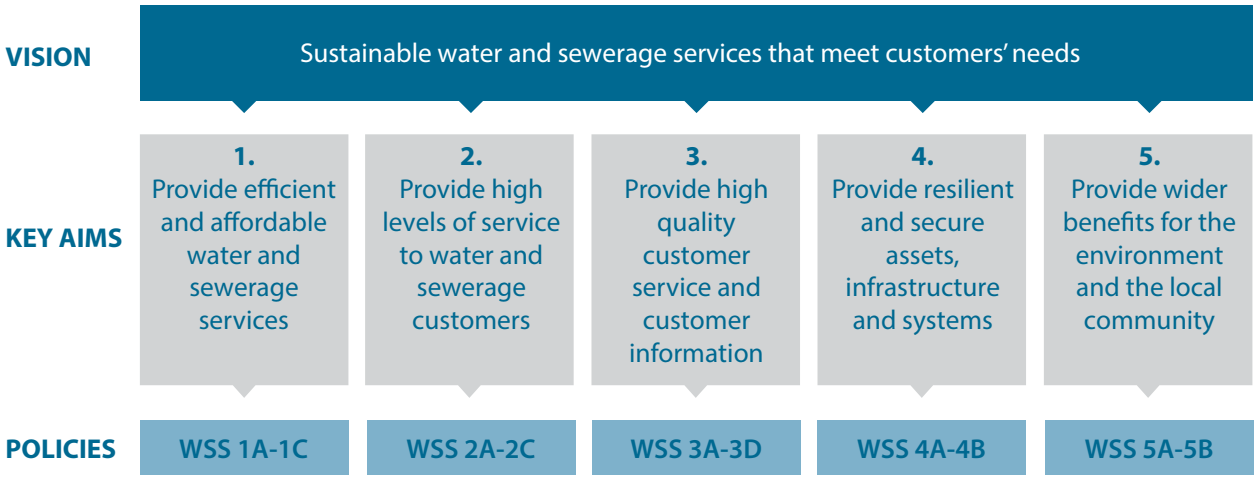
Service Delivery Strategy

Need for Change

5.7 Meeting these challenges and providing the highest possible levels of service for customers requires a more sustainable approach to water and sewerage service provision. For drinking water, this means examining how service improvements can be made throughout the entire supply chain, from the water source right through to consumers' taps. For sewerage services, this means managing the system from the toilet/plug hole through to the end of the wastewater discharge pipe. We cannot continue to rely on expensive high energy drinking water and wastewater treatment solutions. We must actively manage water demand and introduce more sustainable treatment solutions to meet the aims of the Water Framework Directive on the protection and sustainable use of water resources. In addition to adopting more sustainable solutions, it will be important to manage existing water and sewerage assets and infrastructure in an efficient and effective manner to manage future costs. As Northern Ireland's second largest land owner, NI Water also has a role to protect and promote biodiversity and, where appropriate, provide public access to its estate for recreational and leisure purposes. These additional benefits are known as ecosystem services and range from maintaining the Mourne Wall and adjacent peat bogs to operating the Visitor and Education centre at Silent Valley.

5.8 The long-term vision is to '**provide sustainable water and sewerage services that meet customers' needs**'. The vision ensures that the three pillars of sustainability (economic development, social development and environmental protection) are considered, as well as affordability. The strategy for achieving this vision is set out in the remaining sections of this chapter and is structured around 5 key aims and a number of policies as shown in Figure 5.1 below.

Figure 5.1 Strategy for Water and Sewerage Services



WSS AIM 1:

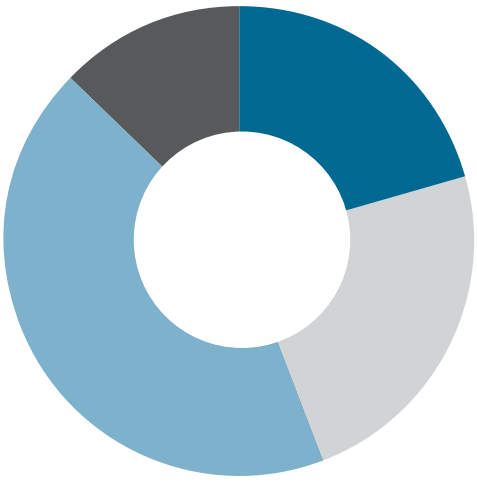
Provide Efficient and Affordable Water and Sewerage Services

5.9 Since being established in 2007, NI Water has embarked upon a major business improvement programme to transform its operations from those of a government organisation (DRD Water Service) to become an efficient, high quality utility service provider. This programme, together with the introduction of full economic regulation, has seen NI Water's operating costs (and average customer bills) significantly reduce.

5.10 While NI Water has successfully reduced its costs since 2007, annual operational costs remain higher than an average English water and sewerage company. If separate household charges were in place, an average water and sewerage bill here for 2014/15 would have been £410 per yr[68] compared to an average bill of £394[69] in England and Wales. Various local factors including NI Water's large operating area, length of network, smaller customer base and complex governance and funding arrangements might contribute to this difference in bills. However, there is no doubt that NI Water's service delivery costs can be reduced further to close the gap with similar companies in the UK. Figure 5.2 provides a breakdown of NI Water's running costs[70] for the two year PC13 period (2013-15).

5.11 The pie-chart splits these costs by percentage and provides a breakdown of an average notional water and sewerage bill (£410 per yr). This aim is about targeting efficiencies and savings in these costs to ensure customers receive high quality services at the lowest possible price. This is to be implemented through the following policies (WSS 1A – 1C).

Figure 5.2 NI Water Costs (2013 - 15)



Area	£m
Contracted Services	93
Operating Costs	292
Maintenance	160
Financial Costs	158
Total Costs	**703**

68 This is based on NI Water's current cost base. If domestic charges are introduced the additional costs of billing and domestic bad debt (unpaid bills) could increase this figure.

69 Figure sourced from the BBC Business News website.

70 Figures from Utility Regulator's PC13 Final Determination.

WSS POLICY 1A:

Effective and efficient system of economic regulation

5.12 A key measure of NI Water's performance is its relative efficiency compared to the wider industry in England and Wales. Increased efficiency will contribute to keeping water and sewerage services costs down, but is unlikely to outweigh the upward pressure on costs over time. In England and Wales, it is estimated that average household water and sewerage bills rose by around 45% between 1990 and 2010[71]. It has been suggested that bills would be 30% higher again but for the efforts of water companies to be more efficient. This demonstrates the importance of having an effective system of economic regulation to drive down costs (and customers' bills) in the absence of competition.

5.13 NI Water has successfully reduced its costs since 2007. However operational costs still remain higher than an average English or Welsh company. Very simplistically, this means that for every £1 spent by an average English or Welsh company, NI Water spent £1.14. When benchmarking NI Water against other UK companies, the Utility Regulator takes account of local factors such as its large operating area, length of network (twice that per capita of any other UK company) and smaller customer base. Nonetheless, for the last twenty years English and Welsh companies have had their own income stream, stable governance and over £100 billion of investment. There is also much less involvement and oversight by central government. It is, therefore, unrealistic to expect NI Water to match the efficiency levels of UK companies in the short term. However, there is no doubt that NI Water's costs can be reduced further to close the gap with similar companies in the UK whilst improving service levels.

5.14 Most water and sewerage customers in Northern Ireland will have no experience of the performance, and levels of service offered by other UK water and sewerage companies. They will, however, be able to compare NI Water's performance to other utilities such as gas, electricity and telecoms. Emphasis should, therefore, be given to benchmarking NI Water's performance, not only against other UK companies, but also against other regulated utilities.

5.15 Economic regulation is needed to drive efficiency, but it is important that the regulatory system does not overly burden NI Water and divert funding and resources from service delivery. The Utility Regulator currently costs customers around £1m per year to regulate NI Water. These costs are small in comparison to NI Water's aim to achieve overall efficiency savings (i.e. £91m in PC10). However, customers also have to fund a further £1m per year to cover the costs of NI Water complying with the regulatory model and preparing all the deliverables required under its licence. Priority should, therefore, be given to reducing regulatory costs for customers by ensuring economic regulation is carried out in line with the principles of better regulation and is transparent, consistent, proportional, accountable and targeted.

71 http://www.aquafed.org/pdf/STW_Changing_course_web_pdf.pdf

WSS 1A PROPOSED ACTIONS:

- Continue to regulate NI Water to improve operational efficiency and close efficiency gap with water and sewerage companies in the UK.
- Reduce future regulatory costs for customers by ensuring economic regulation is proportional, targeting those areas where improvements are most needed (and avoid placing unnecessary red tape and regulatory burden on the water industry).
- Put in place an effective system of benchmarking NI Water's performance against other utilities.

WSS POLICY 1B:

Manage future costs through innovative management of assets and infrastructure

Maintenance Costs

5.16 Around £80 million per annum, or around one quarter of revenue requirements, pays for maintenance of the water and sewerage system. Maintenance costs increase as infrastructure and assets age. Maintenance also increases as the size of NI Water's asset base increases. The current investment policy is to prioritise funding on maintenance first before investing on service improvements. Without effective maintenance, water and sewerage assets and infrastructure will deteriorate and break down. This not only impacts on services for customers but can also impact on the environment.

5.17 NI Water does not currently have the information or systems to allow it to prepare a robust assessment of future asset maintenance needs based on risk to service. In the absence of this information, the Utility Regulator has determined a level of asset maintenance using econometric analysis of asset maintenance investment by other water and sewerage service providers. Priority should, therefore, be given to putting in place the systems necessary to collect and analyse asset information to determine future maintenance and investment needs. This will ensure that future levels of water and sewerage maintenance funding will be based on need and prioritised accordingly.

Power Costs

5.18 Pumping and treating water and sewage is extremely energy intensive. Annual power costs already account for over 1/5 of NI Water's operating costs. Growth, or future improvements in infrastructure needed for European compliance, will both see energy costs rise even further. To manage future power costs and carbon emissions, NI Water will need to deliver 'greener' services. This means continuing to maintain and upgrade assets and infrastructure to improve services and protect the environment. However, this must be done without creating a legacy of costly high energy assets and plant to be paid for by future customers.

Whole-life Investment Decisions

5.19 To help manage maintenance and power costs both now and in the future, it is important that future investment is cost effective over the life of any new infrastructure and assets. Solutions that offer the greatest value for money in terms of whole life costs versus whole life benefits should be progressed. This means taking account of long-term maintenance costs, carbon emissions, energy costs, traffic disruption, etc. This approach should not only be applied to proposals

to invest in new assets/infrastructure, but also to maintenance proposals.

Research, Development, Innovation and Invest to Save

5.20 It is recognised that Research, Development and Innovation (RDI) has a role to play to improve the future delivery of services. However, it is also recognised that investing in RDI can be expensive and carries risks. The policy is for NI Water to continue to maintain and implement a RDI strategy with the aim that this will assist improved performance and the delivery of further efficiencies through the timely provision of focused, applied research and development support to all areas of business need. Where possible, this should be through collaborative projects, such as those progressed by UK Water Industry Research (UKWIR), to make full use of opportunities for sharing RDI costs with other organisations. Opportunity should also be taken to encourage innovation across the supply chain through the procurement process. Where it can be demonstrated that new technology will improve operational efficiency and performance, investment should be made to reduce future operational or maintenance costs. This could include installing new IT systems and remote monitoring.

WSS 1B PROPOSED ACTIONS:

- Continue the current water and sewerage investment policy of prioritising maintenance needs over enhancement.
- Revise the appraisal process for enhancement and maintenance projects to ensure solutions that provide the greatest value for money, in terms of whole life costs versus whole life benefits, are progressed.
- Put effective systems and processes in place to collect and analyse asset information to determine future maintenance and investment needs.
- Continue to maintain and implement a Research, Development and Innovation strategy with the aim that this will assist improved performance and the delivery of further efficiencies. Where possible, full use should be made of opportunities for sharing Research, Development and Innovation costs with other organisations.
- Investment should be made in new technology/systems where it can be demonstrated that these will improve operational efficiency and performance and reduce future operational or maintenance costs.

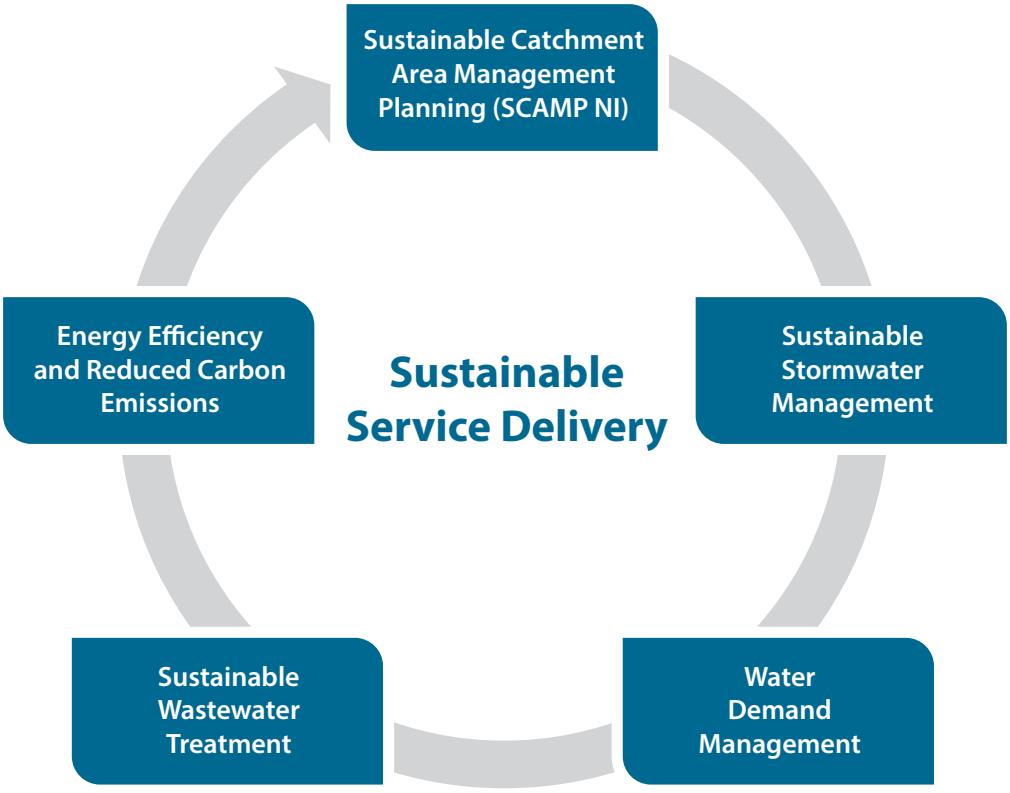
WSS POLICY 1C:

Transform water and sewerage assets and infrastructue through sustainable solutions

Sustainable Service Delivery

5.21 To manage future maintenance and power costs, future investment (on maintenance, quality, service levels or growth) must be sustainable. This means moving away from traditional high energy water, wastewater and drainage solutions and adopting innovative, natural approaches where issues are addressed at source. It is unlikely that sustainable solutions can be provided by NI Water alone. For example, better drinking water quality might best be achieved by land management and pollution control to improve raw water quality, rather than extending treatment processes. Figure 5.3 outlines the approach to sustainable service delivery and the five key policies that are needed.

Figure 5.3 Sustainable Service Delivery



Sustainable Catchment Area Management Planning (SCAMPNI)

5.22 SCAMPNI is a technique for achieving improvements in raw water quality (and drinking water quality) by managing diffuse pollution within an integrated catchment plan, rather than through energy-intensive treatment processes, to deliver progressively marginal reductions in pollution from point discharges of wastewater. This is covered in DW Policy 1C in Part 2 of this Strategy.

Sustainable Storm Water Management

5.23 This is about managing storm water locally through land management, urban design, the use of sustainable drainage systems (SuDS), storm water separation and sewer infiltration reduction rather than providing progressively larger sewerage systems. This is covered in FRMD Policies 1C, 1D, 2C, 2D and 3B in Part 3 of this Strategy.

Sustainable Wastewater Treatment Solutions

5.24 This is about gradually transforming the wastewater infrastructure and asset base so that it costs significantly less to operate and maintain, whilst simultaneously enhancing compliance and providing for growth. This is covered in EP Policy 3B in Part 4 of this Strategy.

Water Demand Management

5.25 This is about reducing leakage and introducing demand management measures that reduce waste, rather than

by increasing water abstraction, treatment and transfer – all with an associated energy demand. This is covered in DW Aim 2 in Part 2 of this Strategy.

Energy Efficiency and Reduced Greenhouse Gas Emissions

5.26 This is about managing and maintaining existing water and sewerage assets to improve energy efficiency and minimise emissions. With energy costs set to soar in the future, NI Water needs to review its current processes and systems to identify how energy efficiency savings might be achieved through innovative management and procurement of its assets and infrastructure.

5.27 The gradual introduction of more sustainable approaches to water and sewerage provision will help manage future increases in energy consumption. However, due to our local demographics, population spread and the need to comply with EU quality standards, it is recognised that NI Water will continue consuming large amounts of energy, pumping and treating water and sewage over large distances, no matter how efficient its operations and assets. To minimise carbon emissions, it will, therefore, be important that NI Water continues to increase the amount of energy it secures from renewable sources such as wind, solar, hydro and anaerobic digestion. Where viable, this should include investing in projects to produce more renewable energy in-house to help manage power costs. This applies to the operation of both existing and new assets and infrastructure.

Progressing Sustainable Solutions

5.28 It is recognised that the development and implementation of sustainable water and sewerage solutions presents NI Water with investment planning and delivery challenges compared to 'conventional solutions.' They often require more planning at the appraisal and scope development stages due to increased stakeholder engagement and land purchase. There are also different types of risks to be managed. NI Water's resources for appraisal, planning and project delivery should, therefore, be aligned to deliver solutions that provide the optimum long-term benefits. NI Water should carefully plan the early stages of project development and consider risks to project delivery. This includes progressing trial projects and working with other stakeholders to identify solutions and secure support for these risks to be accepted and managed.

5.29 Appropriate effort should also be made to identify and secure sufficient land early in the project phase to give the option of larger footprint process solutions that typically result in lower operating costs. NI Water should also consider the advance purchase of land to accommodate future expansion of works using more sustainable solutions.

5.30 The key challenges to implementing sustainable solutions are to: undertake the strategic studies and pilot trials; address any legislative and regulatory barriers; allocate actions across different stakeholders; secure funding to ensure co-ordinated delivery; and allow the benefits of each stage of development to be assessed before the next stage of implementation begins. The development of integrated sustainable solutions, therefore, needs:

- careful planning of strategic investigations, trial projects and solution development leading up to project delivery;

- a more flexible and responsive approach to solutions allowing a phased approach, where this is appropriate;
- funding for innovative development with uncertain outcomes; and
- the willingness to accept that some solutions will not perform as expected and further investment may be required to secure the desired outcome.

WSS 1C PROPOSED ACTIONS:

- Put in place a long-term strategy to transform the water and sewerage infrastructure/assets base to be less energy intensive through sustainable solutions.
- Explore opportunities to invest in renewable energy generation to reduce running costs.
- Explore opportunities to generate renewable electricity through innovative management of existing water and sewerage assets such as: generating hydro-power from excess water mains pressure; and installing solar panels at facilities.
- NI Water should carefully plan the early stages of project development and consider risks to project delivery. This may include progressing trial projects and working with stakeholders to identify solutions and secure support that these risks be accepted and managed.
- Identify and secure sufficient land early in the project phase to give the option of the selection of larger footprint process solutions that typically result in lower operating costs. This includes purchasing land to accommodate future expansion of works using more sustainable solutions.

WSS AIM 2:

Provide High Quality Services to Water and Sewerage Customers

5.31 Since 2007, the Northern Ireland Assembly has invested around £1.6 billion on improving water and sewerage services. This has raised the quality of drinking water and improved environmental compliance. Figure 5.4 shows how compliance levels have improved since 2005.

Figure 5.4 Improvements in Compliance

	Compliance Levels (%)									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Drinking Water Quality	99.49	99.64	99.6	99.69	99.80	99.87	99.84	99.77	99.81	99.84
Urban Wastewater Treatment	67	77	85	90	91	96	96	98	98	98

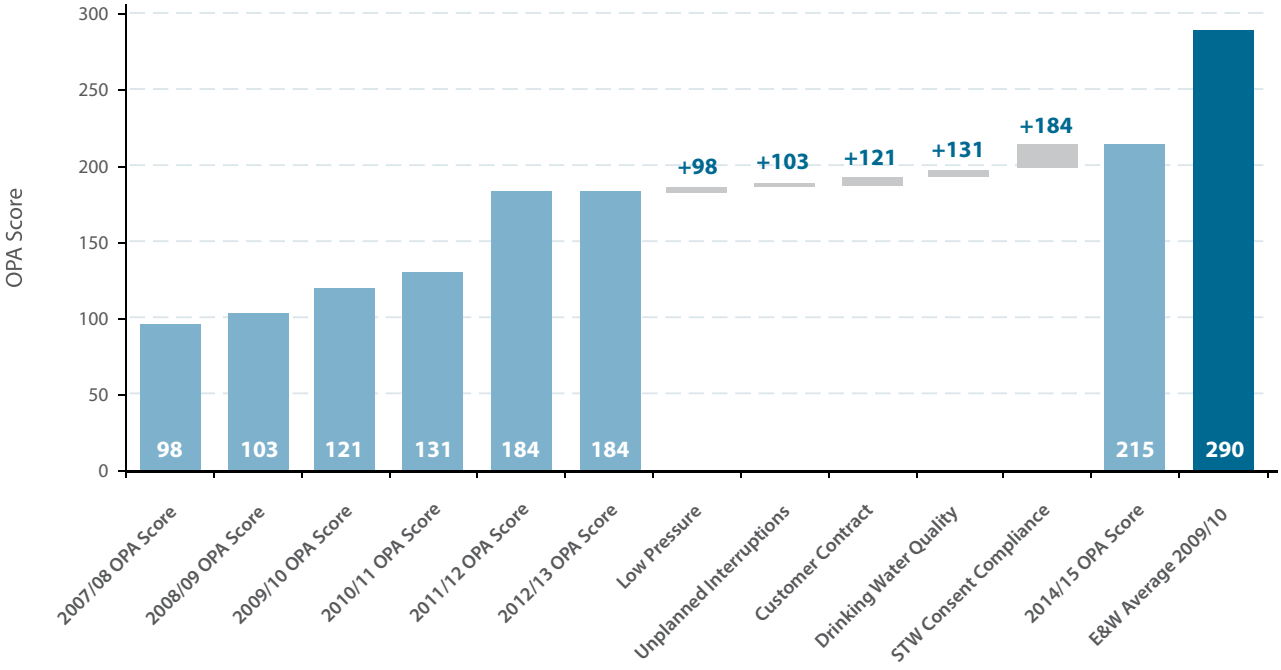
5.32 These high levels of compliance show that drinking water is wholesome and safe, and that the environment is protected from wastewater discharges. However, compliance is only one aspect of service performance. It is also important that water and sewerage services meet customer needs in other areas such as supply interruptions, low pressure and out of sewer flooding. It is, therefore, important that the finite investment available is used to improve performance in all areas of customer service.

5.33 The Utility Regulator assesses NI Water's overall service performance using the Operational Performance Assessment (OPA). This is a system of assessment that takes data on water services, sewerage services, customer service and environmental compliance and scores water and sewerage companies based on their performance. This score is then weighted using information on consumers' views to give a final OPA score. NI Water's OPA score is published annually in the Utility Regulator's Cost and Performance Report[72] where it is compared with relative scores from other UK companies and historic achievement.

5.34 Figure 5.5 is taken from the Utility Regulator's Final PC13 Determination and shows how NI Water's OPA score has continued to improve since 2007. Despite significant improvement in NI Water's OPA score, the company is still some way behind the average scores achieved by England and Wales companies. This illustrates the challenge and opportunity for further improvement as assessed by the Utility Regulator.

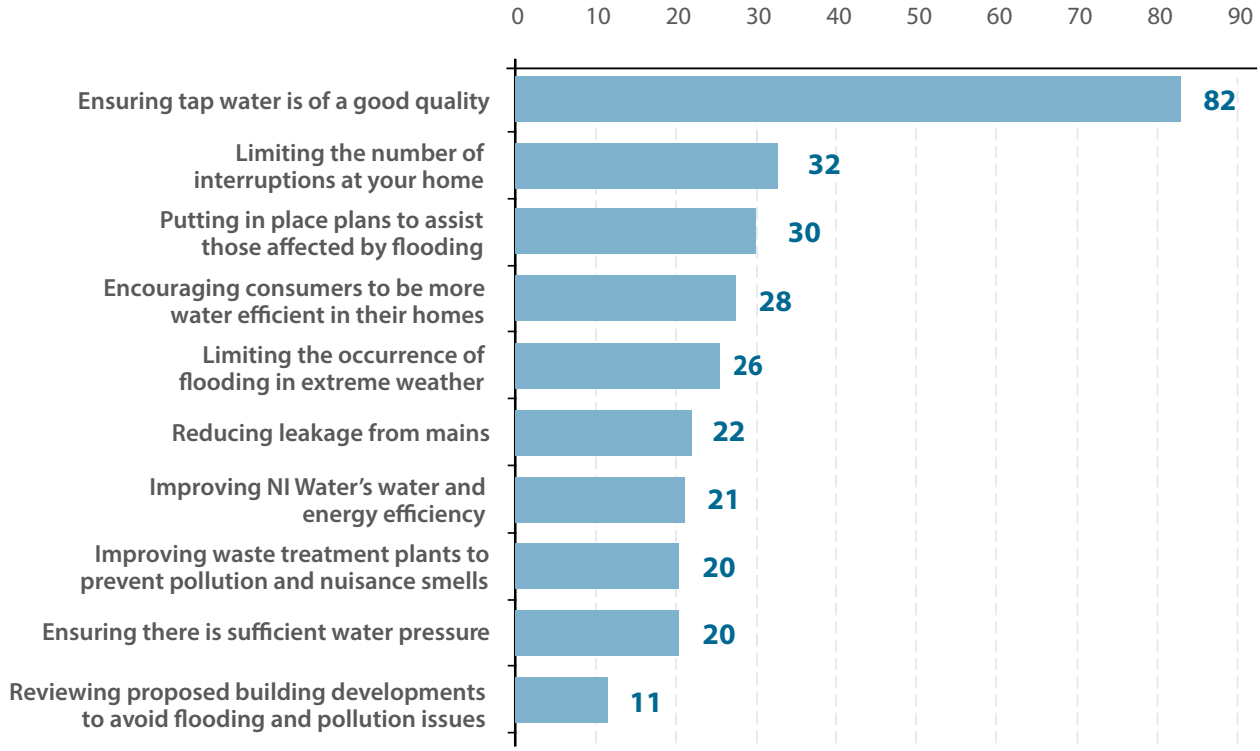
72 http://www.uregni.gov.uk/uploads/publications/Cost_and_Performance_Report_for_2013-14.pdf

Figure 5.5 Projected improvements to NI Water's OPA score



5.35 It is imperative that customers' views and complaints are also used to inform future investment decisions. Through consumer research completed in 2012 to inform the Strategy, domestic customers were asked for their three most important service level areas. The results of this are shown below in Figure 5.6 which ranks the service areas in order of their importance to customers.

Figure 5.6 Domestic Customers' Three Most Important Service Level Areas



5.36 Ensuring good quality tap water is by far customers' highest priority. Reducing the number of water supply interruptions is ranked second. Encouraging water efficiency in homes and assisting those affected by flooding were identified as priorities for over a quarter of domestic customers. Reducing leakage and ensuring sufficient water pressure were identified as priority by over 22% of non-domestic customers. This aim is about targeting future investment to ensure all water and sewerage customers in Northern Ireland receive the highest possible service levels for the funding available and make NI Water one of the best performing companies in the UK. This is to be implemented through the following policies (WSS 2A – 2C).

WSS POLICY 2A:

Provide high levels of service to all water and sewerage customers

Drinking Water Quality

5.37 Figure 5.6 shows that drinking water quality is by far consumers' top service level priority. Drinking water must meet strict legal standards regulated by the Drinking Water Inspectorate (DWI). The DWI ensures that action is taken if these standards are not met. In 2014, more than 100,000 tests were carried out with a pass rate of 99.84 % per cent. These high levels of drinking water quality have been achieved through sustained investment in water treatment facilities and water mains rehabilitation. To make further marginal improvements in drinking water quality compliance, hundreds of millions of pounds of additional investment is likely to be needed. This seems excessive and is unlikely to represent good value for money. The priority is to sustain overall compliance levels and address localised drinking water quality issues so all customers receive high quality drinking water. In 2014/15, NI Water received around 7,000 customer contacts about drinking water. The majority of these related to the colour, taste and odour of tap water. Information from customer contacts and monitoring should, therefore, be used to inform investment decisions.

5.38 The long-term policy is to adopt a risk management approach to sustain current levels of overall drinking water quality compliance by addressing on-going maintenance, local water quality issues and any new/emerging regulatory requirements or identified risks. This is covered in more detail in DW Aim 1 in Part 2 of this Strategy.

Water Supply Interruptions

5.39 Limiting the number of supply interruptions is consumers' second most important service level priority. In 2014/15, more than 112,000 properties were affected by unplanned interruptions to supply lasting more than three hours; over 43,000 by unplanned interruptions lasting over six hours (the significant increase in both was due to industrial action); with a further 47,000 affected by planned interruptions. Yet the priority given to reducing supply interruptions was relatively low in comparison to drinking water quality. This can be attributed to customers' perceptions that supply interruptions are generally infrequent and short-term.

5.40 No matter how much money is invested in maintenance, there will always be bursts within a pressurised distribution system of over 26,700 km of water mains. The important issue is how quickly bursts are fixed and water supplies restored. Similarly, in managing and maintaining so many kilometres of water mains, planned supply interruptions will be necessary to carry out important work. In both scenarios, it is essential that those customers affected are kept well informed with up-to-date information on when their supplies will be interrupted and restored. NI Water should review and determine the target time, with stakeholder consultation, for restoring supply after an unplanned interruption. The long-term priority is to reduce the number of properties that experience unplanned supply interruptions, identify and resolve problems quickly and ensure customers are effectively informed of planned supply restrictions.

Internal and External Sewer Flooding

5.41 Putting plans in place to help those affected by flooding and reducing flooding during extreme weather were consumers' third and fifth most important priorities. This is understandable given the damage and distress caused by such flooding. Internal sewer flooding affects on average 120 properties per year[73]. The long-term proposals for managing flood risk are set out in Part 3 of this Strategy. Under FRMD Policy 4C, NI Water will 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 gradually remove all properties at risk of out of sewer flooding

on this register. NI Water will also continue to educate consumers on the importance of not flushing inappropriate items/ substances into sewerage systems to prevent the flooding and pollution incidents caused by blockages.

Water leakage

5.42 To provide sufficient supplies at our taps and showers, water is often pumped to pressure through the distribution system. This causes water to leak from any defects in the system. This water has been abstracted, treated and pumped through the system and has financial and environmental costs. It is, therefore, important that leakage is kept to a minimum. However, with a pressurised system of over 26,700 km of pipe with thousands of joints vulnerable to ground conditions and traffic pressure, it will never be possible to reduce water leakage to zero. Reducing leakage from water mains was consumers' sixth most important service area. Its relatively low weighting suggests consumers recognise that leakage is inevitable in a pressurised system of water mains. The long-term policy is to first achieve and then exceed

73 http://www.consumercouncil.org.uk/filestore/documents/Connecting_with_Consumers_Report.pdf

the sustainable economic level of leakage (SELL) which in 2014 was estimated to be 159 Ml/day. The SELL is the level of leakage where it becomes economically and environmentally (in carbon terms) unviable to invest in further leakage reductions. The proposals for leakage reduction are set out in more detail in DW Aim 3 in Part 2 of this Strategy.

Energy and Water Efficiency

5.43 Improving NI Water's water and energy efficiency was consumers' seventh most important area. This recognises that it takes lots of energy to pump and treat drinking water and wastewater. The proposals for energy and water efficiency are set out in WSS Policy 1C and in DW Aim 3 in Part 2 in this Strategy.

Wastewater Treatment

5.44 Improving wastewater treatment to prevent pollution and nuisance was consumers' eighth most important service area. The 2014 high level of wastewater treatment compliance (98%) has been achieved through sustained investment in wastewater treatment facilities. This investment at treatment facilities should continue to improve compliance further. However, more emphasis now also needs to be given to sewerage networks to reduce pollution incidents, out of sewer flooding and development pressures. The long-term proposals for wastewater treatment and sewerage are covered in Part 4 (EP Aim 3) of this Strategy.

Water Pressure

5.45 In 2014/15, around 4,800 households complained about low pressure. Yet, ensuring there is sufficient water pressure was consumers' ninth most important service area. Similar to findings in relation to supply interruptions, consumers appear relatively satisfied with current pressure levels. Drops in pressure are relatively infrequent, and thus, improvements are moderately prioritised. The long-term policy is to continue to maintain a register of properties at risk of receiving low pressure and invest to gradually remove all properties from this register.

New Development

5.46 Building developments to avoid flooding and pollution issues was consumers' least important service area. Water and sewerage infrastructure are essential for future economic development and growth. Priority needs to be given to ensuring water and sewerage infrastructure investment plans are integrated into development plans. This is covered by DW Policy 2E (Part 2), FRMD Aim 1 (Part 3) and EP Policy 3B (Part 4) of this Strategy.

Strategic Infrastructure Planning

5.47 Future wastewater treatment and sewerage upgrades should be aligned and co-ordinated with development plans and improvements in other drainage infrastructure including roads, rivers and culverts. To achieve this, priority should be given to developing and delivering an integrated strategic drainage and wastewater infrastructure plan to facilitate future development needs, reduce flooding and protect/improve the quality of water in the environment. This is covered in FRMD Policy 3A in Part 3 of this Strategy.

WSS 2A PROPOSED ACTIONS:

- Adopt a risk management approach to sustain current levels of overall drinking water quality compliance by addressing on-going maintenance, local water quality issues and any new/ emerging regulatory requirements or identified risks.
- Reduce the number of properties that experience unplanned supply interruptions, identify and resolve problems quickly and ensure customers are effectively informed of planned supply restrictions.
- Continue to maintain a register of properties at risk of internal and external sewer flooding (due to sewer overloading) and invest to gradually remove all properties from this register (see FRMD Policy 4C).
- Continue to educate consumers on the importance of not flushing inappropriate items/substances into sewers to prevent the flooding and pollution incidents caused by blockages (see Policies EP 3A and FRMD 4C).
- Achieve and maintain the sustainable economic level of leakage (SELL) (see DW Policy 3A).
- Continue to maintain a register of properties at risk of receiving low pressure and invest to gradually remove all properties from this register.
- Develop and deliver an integrated strategic drainage and wastewater infrastructure plan to facilitate future development needs, reduce flooding and protect/improve the quality of water in the environment.

WSS POLICY 2B:

Maintain accurate information on water and sewerage assets, infrastructure and consumers' views

Information on Customer Complaints and Priorities

5.48 Customers are the most important part of any business. It is, therefore, essential that accurate and reliable information is collected on customer complaints. This information is invaluable for addressing problems in water distribution systems and sewerage networks which are below the ground and are often hard to detect. For example, complaints in relation to the colour, taste and odour of drinking water are used to inform the water mains rehabilitation programme.

5.49 As part of the water industry regulatory price control process, NI Water and the Consumer Council already undertake detailed research to identify their consumer priorities for service level improvements. The results of the most recent research completed in 2014 are set out in the Consumer Council's Connecting with Consumers Report[74]. This informs NI Water's 6 year investment programme for the 2015-21 period. Consumer research should continue to be completed as part of the price control process to inform water and sewerage investment plans. This should include appropriate follow-up work to ensure consumer priorities have been met.

Annual Reporting

5.50 NI Water's performance is reported annually through its Annual Reports and the Utility Regulator's cost and

74 http://www.consumercouncil.org.uk/filestore/documents/Connecting_with_Consumers_Report.pdf

performance reports. Annual Reports on drinking water and wastewater compliance are also published by the environmental regulators.

Information on Assets, Infrastructure and Processes

5.51 Robust and reliable information on water and sewerage infrastructure and assets is needed to inform future investment plans and target improvements where they are most needed. This includes:

- Maintaining registers of the number of properties at risk of internal/external sewer flooding and properties at risk of receiving low water pressure;
- Monitoring information such as drinking water quality, meter readings, wastewater flow monitoring and sewerage spill monitoring;
- Keeping accurate records on incidents such as water mains bursts, sewer blockages and pollution incidents (and spills); and
- Collecting accurate information on wastewater assets and infrastructure to inform the development of robust and holistic drainage area plans (DAPs).

5.52 Priority should be given to improving the accuracy, reliability and consistency of all this information to help improve water and sewerage operations and inform future investment plans. This information includes customer, financial, management, process control and asset data.

WSS 2B PROPOSED ACTIONS:

- Collect accurate and reliable information on customer complaints to inform future investment plans.
- Consumer research should continue to be completed to inform water and sewerage investment plans. This should include appropriate follow-up work to ensure consumer priorities have been met.
- Continue to improve the accuracy, reliability, security, and consistency of information - customer, financial, management, and asset information.

WSS POLICY 2C:

Effective customer education and public awareness

5.53 NI Water will continue to manage its assets efficiently to reduce both wastewater and pollution incidents. A major part of this will involve working to influence consumer behaviour through education and public awareness, which will encourage a wider acknowledgement of water conservation and more environmentally friendly lifestyle choices. While infrastructural investment is important, the customer has a major role to play in how vital services provided by NI Water are used.

5.54 Research[75] has indicated that customers place high priority on education to promote greater water efficiency. Over 30% of respondents said they would like to see an enhanced education programme to promote water efficiency in their day-to-day lives.

Water Efficiency

5.55 NI Water provides a wide-ranging educational service, primarily but not exclusively designed with schools in

75 Connecting with Consumers Report which can be viewed at http://www.consumercouncil.org.uk/filestore/documents/Connecting_with_Consumers_Report.pdf

efforts to promote water efficiency within Northern Ireland, and has distributed approximately 4,500 water audit packs to properties, in addition to 3,000 cistern devices. While it is encouraging that 50% of those surveyed say they feel quite or well informed about water efficiency, there is still work to do in enhancing this depth of knowledge. NI Water is encouraged, as part of PC15 commitments, to further promote some of the 'everyday' practical steps that can be taken to use water in a more efficient manner. Furthermore, NI Water is also encouraged to work with partner organisations to promote a 'water wise' strategy in homes and businesses, as well as the uptake and installation of water efficiency devices.

What can be disposed of in the sewer

5.56 NI Water's public awareness campaigns -'Bag It and Bin It', 'The Dirty Dozen' and Fats Oils and Greases, inform customers about the importance of not putting inappropriate items down sewers. Information leaflets about the campaigns are available on NI Water's website. Customers surveyed as part of PC15, recognised that investment in education could reduce sewer blockages and thus reduce flooding incidents. An awareness of the campaigns, amongst those surveyed, could be improved by an appropriately funded education campaign.

Education and Public Awareness Campaigns

5.57 Consumer education on water efficiency and flushing inappropriate items are covered in DW Policy 2D (Part 2) and EP Policy 3A (Part 4) of this Strategy. The long-term policy is to continue investing in education and public awareness campaigns to promote prioritised key messages, through the continued work of the Water Bus, school visits, events and other educational activities. Consideration of new opportunities to enhance customer education in the future may facilitate reaching a wider audience. Assessing the outputs of previous campaigns may facilitate NI Water in their delivery of future key messages. Further development of partnerships with existing and new organisations could also deliver shared benefits.

WSS 2C PROPOSED ACTIONS:

- Assess the outputs of previous education and public awareness campaigns to enhance future proposals that will reach a wider audience.
- NI Water should further develop effective partnerships with other organisations where there are shared benefits of the campaign.

WSS AIM 3:

Provide High Quality Customer Service and Customer Information

5.58 Customers are the most important part of any business and NI Water's goal is to provide a range of essential services and associated contact channels which meet the rising expectations of customers. Findings from the latest customer research show that most customers are satisfied with the service provided most of the time. Customers simply expect the service to work.

5.59 Significant progress has been made in relation to customer measures since NI Water was formed in 2007, and the company fully appreciates that there is a great deal more that can be done to deliver the standards of service their customers will expect in the future. NI Water is committed to providing high quality services to all its customers. Its Domestic Customer Charter sets out the standard of service customers can expect to receive. This aim is about building on these improvements to provide the best possible standards of customer experience.

WSS POLICY 3A:

Consistent, accessible and timely customer information

5.60 NI Water recognises the importance of customers being able to make contact using whichever media channel is convenient to them. The company provides a range of options to facilitate customer contact and has redeveloped its website (see below), developed a Smartphone application and has Facebook, Twitter and YouTube accounts to make it easier for customers to keep in contact.

5.61 Digital media provides additional opportunities to communicate with customers and should help NI Water keep the costs of customer contacts down. Digital and social media will also allow NI Water to keep customers better informed regarding operational issues. NI Water should maximise the use of these media to inform customers about unexpected operational issues, such as bursts, planned works and mains refurbishment.

WSS 3A PROPOSED ACTIONS:

- Continue to keep customers informed with up to date information through a range of communication channels, including the website and social media.
- Launch a customer self service facility and seek to develop it to their needs and to improve their experience.

WSS POLICY 3B:

Improving and measuring the customer experience

Customer Contacts and Complaints

5.62 Substantial efforts have been made to drive down call volumes from previous levels of over 350,000 per annum through the analysis of customer contacts and business improvement initiatives. This includes the implementation of a High Volume Call Answering (HVCA) system to deal with increased customer contacts and the provision of information to customers during incidents. In 2014/15, NI Water met its target of no more than 247,500 calls, receiving around 231,000 calls.

5.63 Having achieved the 10 day target response time for written complaints (DG7) with a performance of 99.96% in 2014/15 against the target of 99.5%, NI Water is aiming to further reduce the number of complaints and the time taken to respond to complaints or enquiries by improving the standard of service delivery and the accuracy of customer data. NI Water is developing measures to record how often customer issues are solved on first point of contact and, if unable to do so, how to keep customers informed about progress. The Company is also developing ways to record repeat issues and introduce process and system changes that will seek to continue to improve customer experience.

Measuring Customer Satisfaction

5.64 There are many water and sewerage service performance measures such as water leakage, water pressure and out of sewer flooding. However, the two headline performance measures tend to be drinking water quality and wastewater compliance. Although overall compliance should provide a strong indication of service quality, it does not reflect customer satisfaction.

5.65 Customer satisfaction is a crucial part of informing how services should be improved. Quarterly independent market research is carried out through telephone surveys of 400 customers who have called NI Water for any reason. These surveys are invaluable and will continue to be used to identify opportunities to improve customer experience. NI Water recently introduced the key customer satisfaction elements from the industry based Service Incentive Mechanism (SIM) that will double the number of customers currently being surveyed and cover the 'end to end' customer delivery process.

5.66 Work should continue with stakeholders to review levels of customer satisfaction and seek to improve processes and deliver value for money services in line with customer expectations. This should include working with stakeholders to develop an overall single measure for customer satisfaction / experience which should then be used as a strategic driver for future investment alongside drinking water and wastewater compliance.

WSS 3B PROPOSED ACTIONS:

- NI Water will continue to seek to reduce the number of complaints received year on year.
- NI Water will develop its ability to resolve issues at the first time of contact, to lessen the need for repeat contacts by defining, measuring and using root cause analysis to improve customer experience.
- NI Water should develop, in conjunction with its stakeholders, an agreed customer experience measure with a view to bench marking itself against other service providers.

WSS POLICY 3C:

Helping vulnerable customers in the community

5.67 NI Water offers a range of free additional services for those customers who require extra support, e.g. those with a disability, older customers or those with a serious medical condition. Customers need to join NI Water's Customer Care Register to get the extra free services that they or anyone in their household would like to receive. These services include:

Doorstep Service: If you have a hearing difficulty NI Water officials will knock the door louder and speak clearly when they call with you. If you have a mobility problem they will allow more time for you to answer the door.

Password scheme: NI Water can provide you with a password to help you identify their staff. If someone claims to work for NI Water but does not know your password, do not let them in.

Carers Contact Service: You can name a carer or relative who can contact NI Water on your behalf or that NI Water can contact if the Company needs to reach you at anytime; or to whom NI Water can post information.

Special Advice: NI Water will try to resolve any concerns you may have by phone. If they can't they will arrange an appointment to visit you at your home.

Information leaflets: All of NI Water's information leaflets and letters are available in Braille, large print and on CD and audio tape.

5.68 The number of individual customers on the Customer Care Register increased by 6% to 3,084 in 2014/15 and there are plans for further increases to ensure that this reflects all of the customers who rely upon the additional free services that NI Water provides.

WSS 3C PROPOSED ACTIONS:

- Continue to promote the Customer Care Register to ensure those who need to avail of these services are aware of them.

WSS POLICY 3D:

Efficient and effective processing of customers' bills

5.69 Further planned service improvements, especially the introduction of a new self-service solution, will continue to reduce call volumes and improve the level of service being provided to customers. These enhancements to the online facilities will include the ability to access and update billing account details, make payments, request septic tank emptying and view up to date operational information via an interactive map.

5.70 Metering is a key part of the service provided by NI Water. Through the PC15 customer research, NI Water recognises customers wish to see improvement of the customer service experience, including accuracy of billing and invoicing processes. For billed customers, the company aims to provide easy to understand, transparent, accurate billing and consumption data and will continue to work with the Consumer Council to further improve the billing format with a view to making bills easier to understand and more transparent for customers.

5.71 NI Water also wants to provide more accurate billing and consumption data and aims to achieve greater accuracy in its measured bills, with 99% based on actual meter reads (at least once per annum), to give confidence to customers and better assist them in managing the efficiency of water use. The target for DG8 (a customer measure relating to metered customers receiving a bill based on a meter reading) in 2014/15 was 99.5% with an out-turn of 99.11%. This target of 99% has been retained at this level through PC15.

WSS 3D PROPOSED ACTIONS:

- NI Water will consider how it may best avail of new technologies to seek to improve the efficiency and accuracy of the meter to bill process.

WSS AIM 4:

Provide Resilient and Secure Water and Sewerage Services

5.72 It is important that our water treatment and distribution systems are resilient to extreme weather events. This is demonstrated by the major water supply incident that occurred in December 2010. A prolonged period of very heavy snowfall with continuous, unprecedented freezing conditions across Northern Ireland, followed by a rapid thaw, resulted in thousands of burst pipes and around 450,000 customers in 215,000 properties having their water supplies interrupted. The situation was exacerbated by a number of non-domestic and domestic properties being unattended for an extended period over the Christmas / New Year holidays, with the result that leaks within properties went undetected for a number of days.

5.73 Following the incident, the Northern Ireland Executive asked the DRD Minister, to bring forward proposals for an external review of the response of NI Water to the 'freeze-thaw incident'. The Utility Regulator was commissioned to carry out an investigation into the incident. In its Report[76], the Utility Regulator concluded that the weather had been of an exceptional nature (1 in 100 year event in established records) and that around 80% of the additional water demand caused by the freeze / thaw leaked from domestic and business water pipes. The Report also acknowledged the dedicated work done by NI Water staff and others in restoring services to customers in extreme weather and difficult operating conditions. However, a number of failures

Burst Water Main following rapid thaw in December 2010

76 http://www.uregni.gov.uk/uploads/publications/Investigation_report_into_the_freezethaw_incident_2010-11_-_AMENDED.pdf

were identified. Key among these were failures in communication with customers, leadership and preparation for a crisis of this magnitude.

5.74 NI Water has implemented many of the recommendations in the Utility Regulator's report. This has included improving customer communication, information and better planning. Some of the key improvements made are summarised in Figure 5.7. These systems need to be continually maintained and reviewed to make any further improvements necessary to effectively manage a major incident.

5.75 This aim is about improving the resilience of water and sewerage assets, infrastructure and systems to preserve services during extreme weather events (e.g. freeze-thaw, flooding, etc.) and ensuring assets are safe and secure. This is to be implemented through the following policies (WSS 4A – 4B).

5.76 Industrial Action was taken by NI Water industrial staff from 22 December 2014 to 21 January 2015. As a result, NI Water had limited resources to respond to incidents outside of standard working hours which had an adverse effect on the service provided. At the DRD Minister's request, the Utility Regulator carried out a review of NI Water's handling of the incidents that arose from the Industrial Dispute. The Regulator's review made eleven recommendations for NI Water to implement by March 2016. Monitoring and reporting of NI Water's progress in delivering the actions will be undertaken on a regular basis against this plan.

Figure 5.7 Key Improvements for Handling Major Incidents

Customer Call Centre	· Increasing the number of telephone lines in the Call Centre including dedicated lines for Elected Representatives. · A new pre-recorded response system - High Volume Call Answering (HVCA) Service - capable of handling 10,000 calls per hour.
Major Incident Planning	· Maintaining a well-developed Major Incident Plan to provide a fully planned, reactive response to operational incidents. · The Plan is regularly activated and exercised in response to real-life emergency situations and through mock incident exercises.
Customer Communications and Information	· Improving the flow of information from the field to the key customer contact points such as the call centre and the website. · This has been complemented by significantly improving the ability of customers to access this information in a major incident. · An improved website with a post code search facility and new social media channels (Facebook and YouTube) amongst others. · NI Water now runs annual customer-awareness advertising campaigns on the need to prepare for the winter.

WSS POLICY 4A:

Improve the resilience of water and sewerage assets, infrastructure and systems.

5.77 It is important that our water treatment and distribution systems are resilient to extreme weather events. Figure 5.11 illustrates some of the different climatic extremes that NI Water has had to contend with over the last few years. Regular flooding after intense rainfall in the summer months. These include: prolonged periods of dry weather causing water scarcity/supply issues; freeze-thaw events following sustained periods of sub-zero temperatures causing thousands of bursts and major supply interruptions; and wild gorse fires in the peatlands in the catchment during periods of hot dry weather causing ash/residue to enter the raw water source.

5.78 Each of these climatic extremes brings its own set of challenges for NI Water. NI Water is, therefore, expected to consider the vulnerability of its services to these hazards and other risks and assess the resilience of its water and sewerage assets and systems to inform future investment requirements.

5.79 With the size of NI Water's infrastructure and asset base, it is necessary to prioritise future investment to improve resilience. The first priority is to improve the resilience of the water supply. The second priority is to prevent internal sewer flooding (e.g. due to a pumping station being flooded) and the third priority is to prevent pollution (e.g. due to treatment works or pumping stations being flooded).

Figure 5.8 Recent Climatic Extremes

Flooding (Nov 2009)

7 mths

Drying (June 2010)

Freezing (Dec 2010)

5 mths

Burning (May 2011)

WSS 4A PROPOSED ACTIONS:

- Assess the resilience of water and sewerage services, assets and systems to extreme weather events and other risks to inform future investment requirements.
- Commence a programme of investment to improve and maintain the resilience of the wider water and sewerage asset base and systems prioritised as follows: (i) Water supply; (ii) Prevention of internal flooding; (iii) Prevention of pollution.

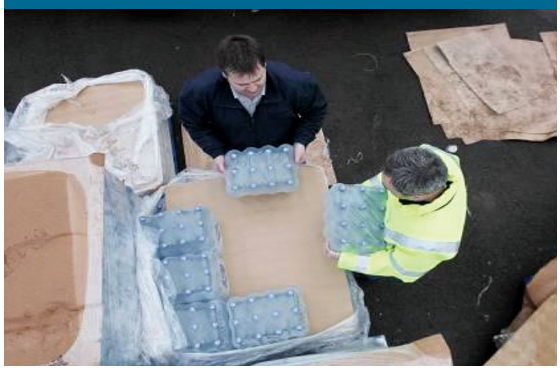
WSS POLICY 4B:

Effective incident planning and preservation of services

Major Incident Planning

5.80 Investing in resilience (WSS Policy 3A) will help improve infrastructure/ asset performance during climatic extremes. However, even if the entire water infrastructure were to be replaced immediately, operations would still continue to be affected during extreme weather events. It is, therefore, important that NI Water can effectively handle major incidents in order to preserve service delivery.

Bottled water supplies being distributed in December 2010



5.81 In 2010, the Department issued a Direction[77] to NI Water setting out requirements for preserving service delivery. This includes guidance for the water industry to make plans and provisions for mitigating the effects of a civil emergency and to preserve services. It is important that NI Water complies with guidance issued under this Direction. It is equally important that all consumers (householders, businesses and industry) play their part. For example, the public needs to be aware of the importance of insulating pipes in preparation for winter to prevent and mitigate leakage and bursts in a freeze thaw.

5.82 To ensure its ability to provide a customer-focused response in the event of a major incident, NI Water continually reviews its Major Incident Plan (MIP). Regular exercises are undertaken to validate the Company's major incident management arrangements, the most recent being November 2015, to test its effectiveness in responding to a major wastewater incident.

Safe and Secure Water Service Assets

5.83 The Department provides guidance to NI Water on the procedures and measures it expects to be put in place in respect of security of water assets and supply. The guidance sets out the priorities for NI Water in respect of security procedures and plans to minimise the risk of contamination and to preserve the provision of water to the population of Northern Ireland. It is expected that these measures will be implemented over the course of the 2015-21 period and beyond.

77 The Preservation of Services and Civil Emergency Measures (Relevant Undertaker) (Northern Ireland) Direction 2010. https://www.drdni.gov.uk/sites/default/files/publications/drd/the-preservation-of-services-and-civil-emergency-measures-relevant-undertaker-northern-ireland-direction-2010.pdf

5.84 Recently, NI Water has experienced increased instances of metal theft, including copper wiring from telemetry sites and iron covers from manholes. This not only impacts on service delivery but also has health and safety implications. It is, therefore, important that NI Water ensures that its assets and infrastructure are safe and secure and that it complies with any guidance issued by the Department.

WSS 4B PROPOSED ACTIONS:

- Maintain and review effectiveness of emergency plans, systems and processes to preserve service delivery during a major incident.
- Continue to educate and increase public awareness about the importance of insulating supply pipes to prevent bursts and leakage during freezing conditions.
- Ensure water and sewerage assets and infrastructure are safe and secure and comply with any guidance issued by the Department.

WSS AIM 5:

Utilise NI Water Assets to Provide Wider Benefits for the Environment and the Community

5.85 NI Water owns over 8,600 hectares of land, much of which is located around water resources in protected[78] areas such as the Mourne Mountains, and offers recreational opportunities for the community in terms of walking and hiking.

5.86 In managing its estate, it is, therefore, important that NI Water takes account of the need to enhance biodiversity and also explores opportunities for greater provision of amenities for the community, where appropriate. This includes ensuring that any future upgrades to assets in protected areas are in sympathy with the local landscape and biodiversity requirements. The photo below is of Fofanny Water Treatment works in the Mournes. This underground facility treats and supplies water to over 100,000 people and is fed from the Fofanny Reservoir. The award winning design has ensured that the treatment works has been integrated into the local landscape with minimal visual impact.

5.87 This aim is about utilising water and sewerage assets (including land) to provide wider benefits for the environment and the community without compromising service delivery. This is to be implemented through the following policies (WSS 5A – 5B).

WSS POLICY 5A:

Manage the NI Water estate to promote recreation, biodiversity and cultural heritage

Estate Management Strategy

5.88 It is important that NI Water recognises the wider public value of its land for recreation, biodiversity and cultural heritage. Whilst delivering core services is paramount, land and assets can be

Fofanny Water Treatment Works in the Mournes

78 This includes: Areas of Special Scientific Interest (ASSIs), Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Nature Reserves, Marine Nature Reserves (MNRs), Ramsar Sites, Natura 2000 Sites, Areas of Outstanding Natural Beauty (AONBs) and World Heritage Sites.

managed to deliver these wider benefits which are often referred to as ecosystem services. Ecosystem services are covered in more detail in EP Policy 5E in Part 4 of this Strategy. NI Water should develop and implement a long-term estate management strategy in partnership with key stakeholders to enhance the recreational, biodiversity and cultural/ social benefits of its land and assets.

Recreation and Access

5.89 Given the area, location and dispersed nature of land and assets owned by NI Water, members of the general public have, and will continue to seek, access to its lands and waters for recreational activities. The long-term policy is for NI Water to permit members of the public, organisations and groups access to its land to facilitate recreational activities. However, access should only be provided where it is safe to do so and where financial resources permit, taking into account the need for safeguarding the quality of drinking water supplied to its customers and the need to protect the environment. NI Water's Recreation and Access Policy[79] sets out the way public access arrangements are communicated and controlled, and provides the public with clear guidance that governs recreational activities and access on the Company's lands and waters. The policy also provides a formal application mechanism for the public to use any NI Water owned land or body of water for recreational purposes.

5.90 Members of the public already enjoy access to NI Water's estate, whether it be walking in the Mournes or fishing at reservoirs. One of the biggest successes is Silent Valley Reservoir. Located within the Mourne Area of Outstanding Natural Beauty, this has become a major attraction with around 50,000 visitors each year. NI Water provides a number of visitor facilities at the location including a restaurant, information centre, conference centre and education centre.

Protect and Maintain Biodiversity

5.91 As with all public bodies, NI Water is required to protect and maintain biodiversity on its landholdings and its influence on biodiversity outside these. As one of Northern Ireland's largest land owners, the way in which NI Water manages its landholdings and operations can have direct and indirect impacts on the environment. A large proportion of NI Water landholdings have an inherent biodiversity value, containing a wide range of habitats and species. A significant area of blanket bog and upland heathland is found in the catchments of reservoirs, much of which is within designated nature conservation sites. Some priority species are found only on NI Water land. Examples include Yellow Marsh Saxifrage (***Saxifrage hirculus)*** on the Garron Plateau and several mosses such as Prickly Earth-moss (***Ephermerum spinulosum)***, which are found around the margins of reservoirs. Land adjacent to treatments works, buildings and other infrastructure also has the potential to provide important habitats for wildlife.

5.92 NI Water should, therefore, look for opportunities to enhance or restore biodiversity. There is much that can be achieved without incurring significant additional costs that can minimise damage, conserve existing features and enhance other features. This includes developing partnerships with relevant environmental organisations to achieve

79 http://www.niwater.com/great-days-out/

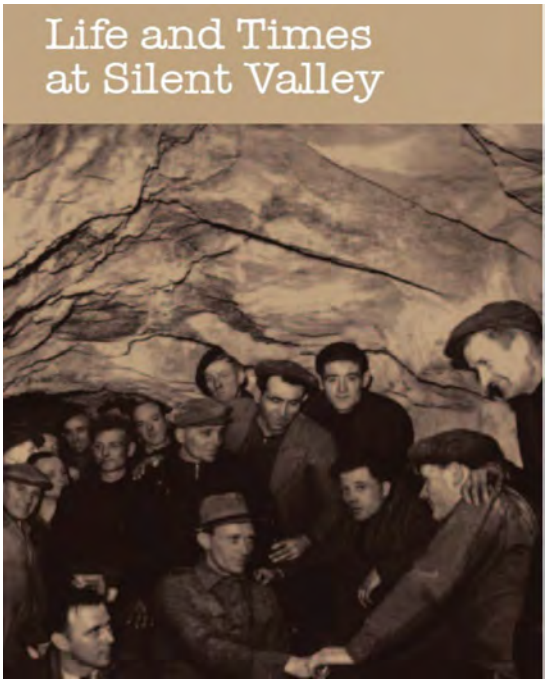
conservation aims and priorities. NI Water has developed a Biodiversity Action Plan that sets out its biodiversity objectives. This plan should regularly be reviewed to meet new or existing biodiversity requirements in line with the Wildlife and Natural Environment Act (Northern Ireland) 2011.

Sustainable Catchment Area Management Planning

5.93 Sustainable Catchment Area Management Planning (SCAMP NI) is a project based methodology by which potential drinking water quality issues are resolved at source through land management based solutions rather than traditional high cost, high energy treatment options. This is often a more cost-effective and energy efficient way of tackling water quality issues. It also offers additional benefits in terms of enhancing and restoring biodiversity. Through its SCAMP NI project, NI Water is working in partnership with a number of organisations, including the Royal Society for the Protection of Birds (RSPB), the Mourne Heritage Trust, the Woodlands Trust, and Ulster Wildlife Trust, on a number of projects. This includes the Garron Plateau where blanket bog is being restored to reduce organic matter being washed into the water source. This not only helps to protect and improve water quality, but also protects the peat bogs which are essential habitats for plant and animal life. NI Water is also working in partnership with other organisations to manage the risk of wild fires within its catchments. The long-term policy is to extend the SCAMP NI project to all drinking water catchments (e.g. in the Mournes). These proposals are set out in more detail in DW Policy 1C in Part 2 of this Strategy.

Cultural Heritage

5.94 NI Water is the guardian of over of 100 recognised historic sites within its estate; these include historic buildings, historic monuments and industrial heritage sites and assets. The Northern Ireland Executive is committed to setting a good example in the care of the 'heritage assets' it owns. In June 2012, updated guidance for government departments and agencies on how to fulfil this commitment was published, the 'Protocol for Care of the Government Historic Estate'. NI Water should plan to implement the protocol and celebrate its heritage as the current provider of Northern Ireland's water and sewerage services and how these services have developed over the last century.



5.95 Through site visits to its treatment facilities and the education centres at Silent Valley and the Heritage Centre at Duncrue Street, NI Water already promotes the heritage of the water industry. The Local's Room within the Silent Valley visitors centre is dedicated to the workers who built the reservoirs. It tells the local history

of the building of the reservoirs and what life would have been like for the workers and their families.

WSS 5A PROPOSED ACTIONS:

- NI Water should develop and implement a long-term estate management strategy in partnership with key stakeholders to enhance the recreational, biodiversity and cultural/ social benefits of its land and assets.
- Permit access to NI Water land/assets to facilitate recreational activities where it is safe to do so and financial resources permit, taking into account the need to safeguard water quality and protect the environment.
- NI Water should, therefore, look for opportunities to enhance or restore biodiversity within its estate, including developing partnerships with relevant environmental organisations to achieve conservation aims and priorities.
- Continue to develop partnerships (e.g. SCAMP NI) with other public, community and voluntary sector organisations to deliver sustainable catchment initiatives, including extending the SCAMP NI project to all drinking water catchments (see DW Policy 1C in Part 2).
- NI Water should continue to implement its Biodiversity Action Plan which should regularly be reviewed to meet new or existing requirements in line with the Wildlife and Natural Environment Act (Northern Ireland) 2011.
- Adopt and implement the ***Protocol for the Care of the Government Historic Estate*** and develop a long-term plan to bring assets covered by this, where necessary, up to a suitable standard and maintain them going forward.
- Explore opportunities to celebrate the local water industry's influence on the social, cultural, industrial and natural heritage of Northern Ireland.

WSS POLICY 5B:

Using surplus water and sewerage assets to provide receational benefits for the community

5.96 As a result of operational improvements, including putting new assets and infrastructure in place, NI Water can be left with various redundant assets, including surplus land and reservoirs. Although these assets may be no longer needed for the provision of water and sewerage services, they may have wider recreational and amenity value to the community. This policy is about ensuring that, where possible, relatively low value redundant assets that have recreational value are retained by the public sector for use by the community.

5.97 NI Water owns 48 impoundment reservoirs, some of which are now out of service and listed for sale in its Estate Management Plan (EMP). Even though these assets are out of service, they continue to require funding each year for routine maintenance work. These costs are likely to increase with the new inspection and maintenance requirements in the Reservoirs Act (Northern Ireland) 2015 [80]. This takes much needed funding away from NI Water's core services. The current policy is to sell these assets to generate much needed income and remove their annual maintenance costs. However, assets such as reservoirs can have important amenity or recreational value to the local community which may be lost if they are sold.

5.98 As a regulated utility, NI Water is currently expected to secure the highest possible price for surplus assets by selling them on the open market. The proposal is to amend the current water and sewerage assets disposal policy to enable relatively low value assets that have high public amenity and recreational value to be transferred within the public sector at a reduced cost and retained for use by the community. This policy would be in line with the Executive's new Community Asset Transfer policy[81] which was published in May 2014. However, it will be important that any decision to transfer an asset within the public estate (and not sell on the open market) will be considered on an individual basis and take into consideration a number of factors that require NI Water's EMP to be revised, including:

- Recent economic issues impacting upon land values;
- The introduction of the Reservoirs Act (Northern Ireland) 2015 which will regulate the maintenance of all reservoirs;
- The public amenity value of a number of 'out of service' reservoirs; and
- The liability costs and risks associated with 'out of service' reservoirs.

5.99 To inform future decisions over asset disposal, assessments should be completed for all surplus assets with potential recreational/amenity value (such as reservoirs) taking account of the above factors.

WSS 5B PROPOSED ACTIONS

- Progress the assessment of 'unused' reservoirs to determine the approach to disposal.
- Develop policy to ensure surplus water and sewerage assets with recreational value are transferred within the public sector, where appropriate.
- Ensure future NI Water Estate Management Plan (EMP) is aligned to Executive policy on disposal of assets, including Community Asset Transfer.

80 http://www.legislation.gov.uk/nia/2015/8/contents/enacted
81 https://www.dsdni.gov.uk/sites/default/files/publications/dsd/community-asset-transfer-policy-framework.pdf

Glossary

Adopted Sewer System	A sewer system that is owned and maintained by NI Water
Annual Exceedance Probability (AEP)	The likelihood of occurrence of a flood of given size or larger occurring in any one year
Aquifer	An aquifer is an underground layer of rock that is saturated with water that can be brought to the surface through natural springs or by pumping
Attenuation Tanks	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.
Biodiversity	Is the variety of all living things.
Catchment	The area drained, either naturally or with artificial assistance, by a watercourse, including all drainage channels, tributaries, floodplains, estuaries and areas of water storage.
Combined Sewer Overflow (CSO)	Combined Sewer Overflows are overflows used in combined sewerage system to discharge storm wastewater directly into watercourses to relieve hydraulic pressure in the system under storm conditions.
Combined Sewer	A sewerage system that collects both wastewater and rain water.
Consumer Council (CCNI)	The Consumer Council for Northern Ireland. CCNI represents the interests of water and sewerage customers to NIW and Government.
Culvert	A structure that allows water to flow under a road, railroad or similar obstruction.
DARD	Department of Agriculture and Rural Development. It 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.
DCAL	Department of Culture, Arts and Leisure
DEFRA	Department for Environment Food and Rural Affairs. National Government Department based in London.
Designated Watercourse	A watercourse that is designated by DARD so that they have powers to maintain the watercourse.
DETI	Department of Enterprise, Trade and Investment
Discharge Consent	All discharges to the water environment are regulated and controlled by NIEA through Discharge Consents.
Discharge Standard	A standard issued by NIEA to allow the discharge of sewage/wastewater into a water body, such as a river. The standard will include conditions, to minimise the effects on the receiving water.

DOE	Department of the Environment
Drainage System	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).
DRD	Department for Regional Development.
Drinking Water Inspectorate (DWI)	The Drinking Water Inspectorate monitors and regulates public drinking water supplies on behalf of the Department for Regional Development. It monitors and regulates private water supplies on behalf of the Department of the Environment.
DW	Drinking Water
Economic Level of Leakage (ELL)	The level at which it would cost more to reduce water leaking from pipes than pump more water into them.
Ecosystem	This is a community of living organisms (plants, animals and microbes) in conjunction with the nonliving components of their environment (things like air, water and mineral soil), interacting as a system.
Ecosystem Services	An interdependent system of living things including people, animals and plants in their physical environment
EP	Environmental Protection
European Commission	The European Commission (formally the Commission of the European Communities) is the executive branch of the European Union. The body is responsible for proposing legislation, implementing decisions, upholding the Union's treaties and the general day-to-day running of the Union. http://en.wikipedia.org/wiki/European_Commission - cite_note-Europa_Institutions-0#cite_note-Europa_Institutions-0
European Directive	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.
European Union	The European Union (EU) is an economic and political union of 28 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.
Eutrophic	A body of water whose oxygen content is depleted by organic nutrients.
Eutrophication	Eutrophication is the enrichment of an ecosystem with chemical nutrients
Flood	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.
Flood Plain	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.
Flood Risk	Flood risk is a measure of the impact of flooding and likelihood that it will occur.

Flood Risk Management Plan (FRMP)	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.
Good Ecological Status (GES)	This is the requirement to be met by all designated water bodies under the EU Water Framework Directive.
Groundwater	Water that occurs below the earth's surface and below the water table
Groundwater Flooding	Groundwater flooding occurs when the water table at a location (point or diffuse) rises to such an extent that groundwater emerges at the ground level
Impoundment Reservoir	A reservoir with outlets controlled by gates that release stored surface water as needed.
International River Basin District	A river basin / catchment which crosses over into the Republic of Ireland.
Investment Strategy for Northern Ireland	The Investment Strategy for Northern Ireland sets out the Executive's priorities for investment in infrastructure (for example new roads, hospitals or sewers) for the years 2011 to 2021.
Mean Zonal Compliance (MZC)	This is the figure used to compare the quality of drinking water from one region to another. It is represented as a percentage figure.
NIEA	The Northern Ireland Environment Agency.
NI Water	Northern Ireland Water.
PC15	Price Control 2015-2021. The PC Process is the process by which UREGNI determines what NI Water should deliver during the period by agreeing a business plan for the company.
POMs	Programme of Measures
Preliminary Flood Risk Assessment	An assessment which identifies areas in Northern Ireland where flood risk is most significant.
Private Drains	A private drain is a pipe or channel owned by an individual, usually the property owner.
Protected Areas	This includes: Areas of Special Scientific Interest (ASSIs), Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Nature Reserves, Marine Nature Reserves (MNRs), Ramsar Sites, Natura 2000 Sites, Areas of Outstanding Natural Beauty (AONBs) and World Heritage Sites.
Raw Water	Water abstracted for drinking water purpose before treatment.
RBMP	A River Basin Management Plan contains a range of measures aimed at protecting, improving and sustaining the use of the water environment, from source to sea.

Regional Development Strategy (RDS)	The RDS sets out the Executive's broad plans for the future development and planning up to 2025.
RIA	Regulatory Impact Assessment. A RIA is an assessment of the impact of a policy in terms of its costs, benefits and risks.
River Basin District	The area drained, either naturally or with artificial assistance, by a watercourse, including all drainage channels, tributaries, floodplains, estuaries and areas of water storage.
Section 75	Section 75 of the Northern Ireland Act 1998. This law requires the Government to have due regard to the need to promote equality of opportunity. Government policies must be reviewed, in a process known as 'screening'. If this screening identifies a potential equality issue then an EQIA (see above) must also be completed.
Sewerage System / Infrastructure	A system of pipes and ducting which collects and transports sewage.
Service Reservoirs	A service reservoir is a water storage container for water that has been treated in a water plant but not yet sent to the customer.
Significant Flood Risk	Significant flood risk is determined by detailed analysis.
Significant Flood Risk Area	Area identified as being at significant flood risk and subject to further mapping and consideration.
Surface Water Flooding	Surface water flooding 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.
Sustainable Development Strategy (SDS)	The SDS sets out how the Government intends to achieve a balance between its economic, social and environmental goals.
Sustainable Drainage System (SuDS)	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.
UKTAG	United Kingdom Technical Advisory Group
Unadopted sewer systems	A sewer system that is privately owned.
Undesignated watercourses	A watercourse that is privately owned.
UREGNI	The Utility Regulator for Northern Ireland (UREGNI) is responsible for regulating the electricity, gas, water and sewerage industries in Northern Ireland, promoting the short- and long-term interests of consumers
Waste Water Treatment Works (WWTWs)	The treatment plant or site where wastewater is treated.

Water Framework Directive	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 Resource Management Plan	A water resources plan shows how a water company intends to maintain the balance between supply and demand for water over the next 25 years.
Water Resource and Supply Resilience Plan	This is a long-term planning document that brings together the areas traditionally covered by Water Resource Management and Drought Plans.
Water Safety Plan	A Water Safety Plan (WSP) is the most effective way of ensuring that a water supply is safe for human consumption and that it meets the health based standards and other regulatory requirements. It is based on a comprehensive risk assessment and risk management approach to all the steps in a water supply chain from catchment to consumer.
Water Treatment Works (WTWs)	The treatment plant or site where raw water is treated to provide safe and wholesome drinking water for public supply.
Watercourse	A stream, river, canal, ditch, drain, cut, culvert, dyke, sluice, valve, overland carrier, millrace or layde. Water mains and sewers are not included in this definition.
WSS	Water and Sewerage Services