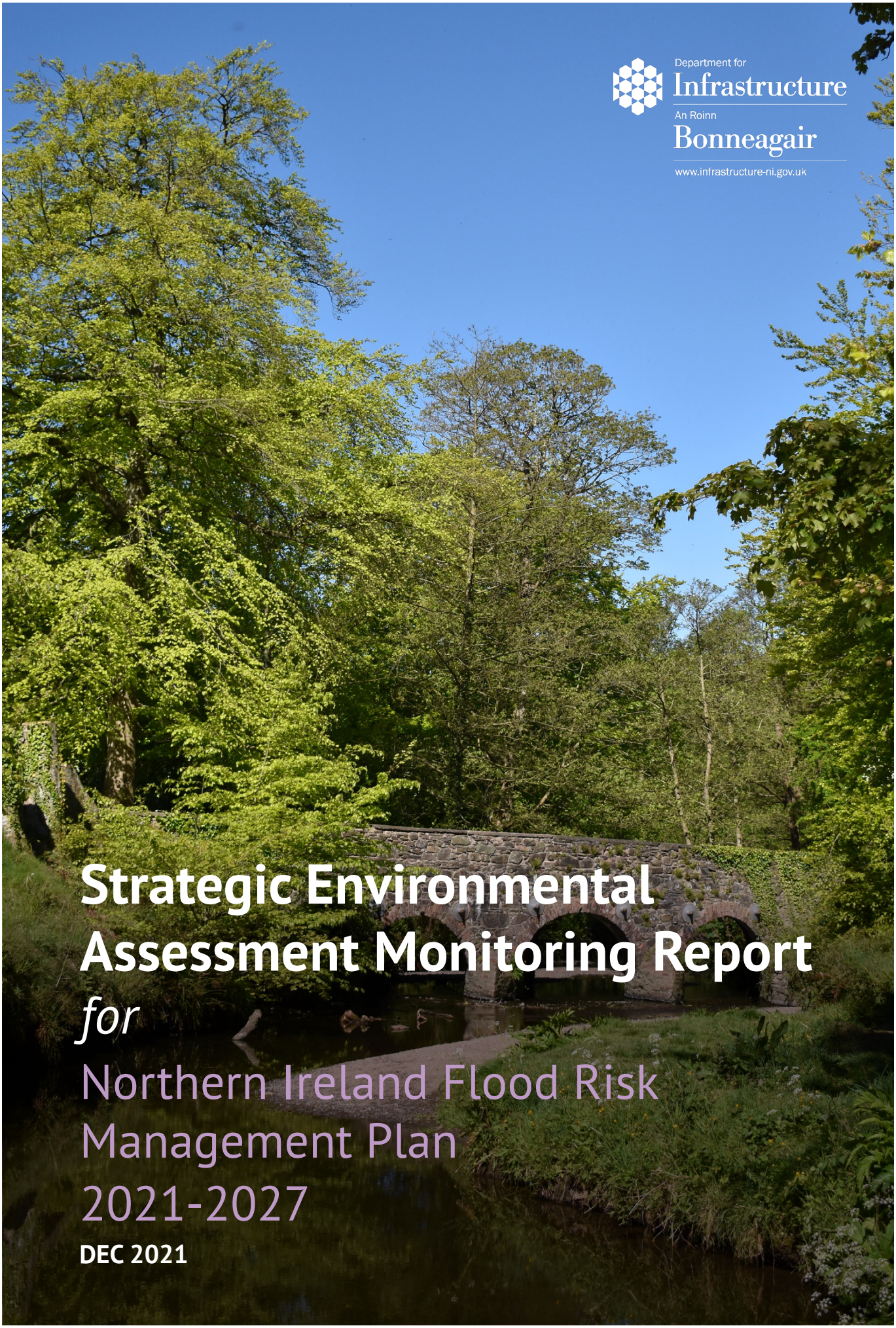

Strategic Environmental Assessment Monitoring Report

for

Northern Ireland Flood Risk Management Plan 2021-2027

DEC 2021

Acknowledgements

This report was prepared by **RPS Group Plc** for Water and Drainage Policy Division (WDPD) of the Department for Infrastructure (DfI).

Cover image: Minnowburn Bridge, South Belfast

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Abbreviations

AAP	Area of Archaeological Potential
AEP	Annual Exceedance Probability
AFBI	Agri-Food and Biosciences Institute
AoHSV	Area of High Scenic Value
AONB	Area of Natural Beauty
APSFR	Area(s) of Potential Significant Flood Risk
ASAI	Area of Significant Archaeological Interest
ASSI	Area(s) of Special Scientific Interest
CCAP	Climate Change Adaptation Programme
CCG	Connswater Community Greenway
CCRA	Climate Change Risk Assessment
CDWGCC	Cross-Departmental Working Group on Climate Change
DAERA	Department of Agriculture, Environment and Rural Affairs
DARD	Department of Agriculture and Rural Development
DfC	Department for Communities
DfI	Department for Infrastructure
EBFAS	East Belfast Flood Alleviation Scheme
EIA	Environmental Impact Assessment
ELC	European Landscape Convention
EU	European Union
FAS	Flood Alleviation Scheme
FCS	Favourable Conservation Status
FRMP	Flood Risk Management Plan
GES	Good Environmental Status
GHG	Greenhouse Gas
HARNI	Heritage at Risk Northern Ireland
HED	Historic Environment Division
HRA	Habitats Regulations Assessment
LCA	Landscape Character Areas
LDP	Local Development Plan
LWWP	Living With Water Programme
MDM	Multiple Deprivation Measure
MS	Marine Strategy
MSFD	Marine Strategy Framework Directive
NI	Northern Ireland
NICCAP	Northern Ireland Climate Change Adaptation Programme
NIEA	Northern Ireland Environment Agency
NIFRA	Northern Ireland Flood Risk Assessment
NILCA	Northern Ireland Landscape Character Assessment

NIRLCA	Northern Ireland Regional Landscape Character Assessment
NIRSCA	Northern Ireland Regional Seascape Character Assessment
NISMR	Northern Ireland Sites and Monuments Record
NPWS	National Parks and Wildlife Service
NSN	National Site Network
ODPM	Office of the Deputy Prime Minister
PAMU	Planning Advisory and Monitoring Unit
PE	Population Equivalent
PfG	Programme for Government
IPPC	Integrated Pollution Prevention and Control
RBD	River Basin District
RBMP	River Basin Management Plan
RSCA	Regional Seascape Character Area
SAC	Special Area of Conservation
SDIP	Strategic Drainage Infrastructure Programme
SEA	Strategic Environmental Assessment
SFRA	Significant Flood Risk Area (Synonymous with APSFR)
SLNCI	Site of Local Nature Conservation Importance
SOA	Super Output Area
SPA	Special Protection Area
SuDS	Sustainable Drainage Systems
SWPA	Shellfish Water Protected Area
UKCP	United Kingdom Climate Projections
UN	United Nations
UNCLOS	UN Convention on the Law of the SEA
UNESCO	United Nations Educational, Scientific and Cultural Organization
WHO	World Health Organisation
WFD	Water Framework Directive
WwTW	Wastewater Treatment Work

1: Introduction

This report is a review of the environmental monitoring recommended in the Strategic Environmental Assessment (SEA) Environmental Report for the 1st cycle Northern Ireland (NI) Flood Risk Management Plans (FRMPs) 2015-2021. Article 10 of the SEA Directive requires that monitoring be carried out in order to identify, at an early stage, any unforeseen adverse effects due to implementation of a Plan or Programme, and to enable remedial action to be taken. Monitoring is carried out by reporting on a set of Indicators established in the SEA Objectives, which allow impacts on the environment to be measured.

Owing to the high level nature of information produced for assessment, it was not possible for the SEA for the 1st cycle FRMPs to present a detailed monitoring strategy based on specific indicators and targets. Instead the Environmental Report proposed a set of generic measures to be used for monitoring of SEA topics. These will be used to identify any unforeseen adverse effects that have occurred from implementation of measures from the 1st cycle FRMPs; not yet complete. This monitoring is being undertaken during development of the 2nd cycle FRMP. Recommendations will also be made on the monitoring strategy to be carried forward for assessment of the implementation of flood risk management measures for the 2nd cycle FRMP.

2: SEA of the 1st Cycle NI FRMPS 2015-2021

2.1 SEA topics

The SEA Environmental Report for the 1st cycle NI FRMPs 2015-2021 established the environmental topics that should be included within the scope of the SEA. The following topics were scoped in for assessment:

- Biodiversity, Flora and Fauna;
- Cultural Heritage;
- Water;
- Geology and Soil;
- Population and Human Health;
- Material Assets;
- Climatic Factors; and
- Landscape.

For each of these environmental topics, objectives were set, and an assessment made of how the FRMPs, alone or in combination with other plans, programmes or policies, might impact upon the topic. The SEA considered whether the environmental effects of the Plans were likely to be significant, and identified potential mitigation measures, in line with the UK guidance on SEA 'A Practical Guide to the Strategic Environmental Assessment Directive (ODPM 2005)[1] and in accordance with The Environmental Assessment of Plans and Programmes Regulations (Northern Ireland) 2004.

[1] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/7657/practicalguidesea.pdf

3: Baseline and Relevant Environmental Issues

This section provides a review and update of the environmental baseline in Northern Ireland, of relevance to the 2nd cycle NI FRMP 2021-2027. This includes a description of the state of the environment at present, and a discussion of the key problems/issues currently being faced in the area.

The baseline description focusses in the first instance on Northern Ireland, however given the shared land boundary with the Republic of Ireland, there is potential for transboundary environmental impacts on water quality, biodiversity etc. in the Republic of Ireland. As such, the baseline description includes reference, where relevant, to conditions in the Republic of Ireland.

3.1 Current State of the Environment

3.1.1 State of the Environment in Northern Ireland

Northern Ireland's most recent state of the environment review (2013)[2] found the situation to be variable. Air quality shows continuing improvement, while water quality has benefitted significantly from improved control of effluents, and rates of municipal waste recycling have been steadily increasing. Significant challenges remain, however, in reversing biodiversity declines and meeting EU objectives for water bodies, landscapes, habitats and heritage.

The main threats identified in the previous 2008 report, namely climate change, land use, and socio-economic growth, continue to create pressures on the environment in Northern Ireland. These key challenges are outlined below:

- **Economic downturn –**
  The most significant change since 2008 with regards to socio-economic growth has been the economic downturn, which has had impacts on housing, development, energy and resource use and on waste production. The 2008 recession has intensified the need to stimulate growth and to use our resources, such as agricultural lands more efficiently whilst protecting and enhancing our natural environment.
- **Living within our limits –**
  Living within our limits relates to the impact of ever increasing populations on the environment in terms of food production, imports, energy use, and water security. There is an increasing realisation that living within our limits, both economically and environmentally, locally and globally, is now a major challenge.
- **Sustainable rural land use –**
  It has been identified that the marine environment, from biodiversity indicators and the status of our waters are under threat. The 2013 State of the Environment report notes the relationship between rural land practices and the water environment, and identifies that a fully integrated approach to management of the land and water environment is needed.

[2] https://www.daera-ni.gov.uk/sites/default/files/publications/doe/corporate-report-from-evidence-to-opportunity-second-assessment-of-state-of-ni-environment-2013.pdf

- **Climate change –**
  Climate change remains an important issue for Northern Ireland, and indeed globally. However recent legislation such as the UK Climate Change Act 2008, along with renewable energy policies and increasing energy costs, are likely to contribute to already positive advancements.

Following on from the key challenges identified, three key principles underpinning the way forward were also listed, and comprise the following:

- Working to achieve **resilient, diverse ecosystems** capable of providing vital services while absorbing pressures and responding to change;
- Valuing and **managing natural resources** to support economic and social prosperity; and
- Protecting the quality of life by **reducing pollution, protecting heritage** and promoting **sustainable land use**.

A summary of the relevant aspects of the current state of the environment in Northern Ireland, as presented in the most recent state of the environment review (2013), and taking into account the most recent Northern Ireland Environmental Statistics Report (2021)[3] , has been provided in **Table 3-1**.

.Table 3-1: Summary of Current State of the Environment in Northern Ireland

Theme	Key Findings
Air Quality	There are 18 air quality monitoring stations in Northern Ireland. Air quality in Northern Ireland has shown substantial improvement in recent years. The average annual mean concentration of NO_2 across Northern Ireland's urban background sites remained relatively stable between 2011 and 2016, varying between 20 and 23µg/m^3. However, since 2017 the average annual mean concentration of NO_2 has fallen below this level, and was 11.2µg/m^3 across Northern Ireland's urban background sites in 2020. The agriculture sector accounted for the majority of ammonia emissions in Northern Ireland in 2019. Other sources include transport, commercial and domestic combustion and industrial processes. Continued effort is required to reduce air pollution from key sources such as road transport and agriculture.
Climate	Since the start of the 20th century records show that the climate in Northern Ireland is changing. In 2018, Northern Ireland's greenhouse gas emissions were estimated to be 19.4 $MtCO_2e$, a reduction of 20% since 1990. Agriculture, transport and energy supply were the largest contributing sectors to greenhouse gas emissions in Northern Ireland in 2018. The UK Climate Change Act commits the UK to reducing emissions by 100% by 2050 from 1990 baseline levels. In 2018, Northern Ireland's total greenhouse gas emissions accounted for 4% of the UK total, higher than its population share of 3%.
Water	The overall status of water bodies in Northern Ireland has not significantly changed from that recorded in 2012, but improvements have been identified in water utility discharges and drinking water quality. In 2019, there were 1,754 water incident reports made to the NIEA of which 53.6% were unsubstantiated.

[3] https://www.daera-ni.gov.uk/sites/files/publications/daera/ni-environmental-statistics-report-2021.pdf

Theme	Key Findings
Marine	The majority of Northern Ireland's 650 km of coastline is protected for its special interest, and a number of our coastal species and habitats are recognised as internationally important. Combined indicators for Soluble Reactive Phosphorus (SRP) in rivers and Winter Dissolved Inorganic Nitrogen (DIN) show no change in recent years. However in January 2014, the Shellfish Waters Directive was subsumed into the Water Framework Directive, resulting in more stringent E. coli standards and a noticeable "drop" in the percentage of designated shellfish waters. Three out of nine designated shellfish water protected areas (SWPAs) complied with the Water Framework Directive guideline E. Coli standard in Shellfish Flesh in 2020.
Land and Landscape	Agri-environment schemes encourage farmers and landowners to manage their land to benefit the environment. At the end of 2020, 48,000 hectares of land in Northern Ireland were under an agri-environment scheme agreement. In NI, over 55 per cent of forests and woodlands are state-owned or managed. The NI Environmental Statistics Report 2021, reported that in 2020/21, 283 hectares of new woodland (65 ha conifer and 218ha broadleaf) were planted and part funded by the European Commission under the 2014 - 2020 Rural Development Programme.
Biodiversity	The Northern Ireland Environmental Statistics Report 2021 reported that in 2020/21, the area of terrestrial protected sites under favourable management in Northern Ireland was recorded as 304.04km^2, which has increased since 2015/16, when just 2.63km^2 were under favourable management. As well as this, between 1994 and 2019, the estimated total wild bird population has increased by 50%, however it should be noted that not all species populations are increasing. The total wetland bird population is estimated to be similar in 2018/19 to what it was in 1994/95.
Built Heritage	The key risks identified to archaeological resources come from agricultural landuse and urban activities. In 2019/20, there were a total of 2,008 scheduled historic monuments protected under Article 3 of the Historic Monuments and Archaeological Objects (NI) Order 1995. Overall there has been a 33% increase in the number of scheduled monuments since 2001/02, reflecting ongoing survey, designation and assessment. The figures provide an indication of this aspect of the rich cultural and built heritage of Northern Ireland, an increasingly important source of "soft power" and an important contributor to the Northern Ireland economy, through attracting tourism and filming.
Waste and Resources	Waste is produced by households, by industrial processes, by the construction and demolition industry, through commercial activities and agricultural practices and by public services and utilities. Waste can affect the environment through its visual impact or by emissions to the air, groundwater and surface water as well as the contamination of land. The Northern Ireland Environmental Statistics Report 2021 notes that The Local Authority Municipal Waste Management Statistics show that the amount of waste sent for energy recovery via incineration has grown exponentially since 2006/-07, whilst the proportion of waste sent to landfill has more than halved in the same timescale. Recycling of waste is becoming much more common in Northern Ireland. The revised Northern Ireland Waste Management Strategy (Delivering Resource Efficiency, 2013) proposed to achieve a 50% recycling rate by 2020 for local authority collected municipal waste.

3.1.2 State of the Environment in the Republic of Ireland

A summary of the current assessment and outlook for the Republic of Ireland across five key environmental policy areas, as presented in the most recent State of the Environment report (Ireland's Environment 2020 – An Integrated Assessment[4]), has been provided in **Table 3-2**.

Table 3-2: Summary of Current State of the Environment in the Republic of Ireland

Policy Area	Overall Assessment
Climate	While there has been some progress on renewable energy and ambitious climate action and adaptation plans, the Republic of Ireland's failure to significantly reduce GHG emissions results in a 'very poor' current assessment. Meeting 2030 targets and the 2050 transition objective will require the full implementation of current policies and measures, and significant national investments.
Air	While overall air quality in the Republic of Ireland is good, there are localised issues with some pollutants (such as particulates) that have serious potential health impacts, resulting in an overall current assessment of 'moderate'. The Republic of Ireland is generally meeting EU air quality limits but not some WHO guideline values in places, and nitrogen oxides exceedance in 2019 is a warning about not being complacent in tackling air pollution. The Republic of Ireland is not on track to meet National Emission Ceilings Directive targets for ammonia, owing to emissions from agriculture. There has been mixed progress in reducing overall emissions from transport and energy. Overall, the Republic of Ireland's prospect of meeting targets and policy objectives is heavily dependent on the implementation of agreed national measures.
Nature	Overall current assessment is 'very poor'. Deteriorating trends dominate, especially for protected habitats. In the absence of far-reaching measures, the outlook is largely not on track to meeting policy objectives.
Water	Overall, current assessment is 'poor'. Trends are mixed, with serious declines in pristine river sites. In terms of outlook, significant challenges remain to achieving full compliance and meeting policy objectives.
Waste and Circular Economy	Overall current assessment is 'poor'; while the Republic of Ireland is meeting current targets, recycling rates for municipal waste and packaging have levelled off and in some cases declined, and waste generation remains high and linked to economic activity, while circular use of material remains very low. Publication of new national waste policy is welcome. Achieving future EU targets and circular economy goals will be dependent on rigorous implementation of waste legislation, policy initiatives and measures.

[4] https://www.epa.ie/publications/monitoring--assessment/assessment/state-of-the-environment/irelands-environment-2020---an-assessment.php

The report identified the following key challenges for the next decade:

- Halt any further deterioration in our natural environment, while supporting our economy and accommodating our growing population.
- Accelerate action to decarbonise and green our economy and society, so achieving climate neutrality by 2050.
- Protect ourselves against the inevitable consequences of climate disruption.
- Start restoring the precious habitats and water bodies that we have lost
- Leave space for nature as part of a new approach to biodiversity protection.
- Designate more of our marine area as protected areas
- Protect air quality by switching to cleaner fuels and energy for transport and heating homes.
- Massively reduce our annual one million tonnes of food waste.
- Foster more sustainable agricultural production and land-use systems and management.
- Invest in essential water services infrastructure that protects drinking water supplies and eliminates discharges of raw sewage.
- Achieve greater efficiency in our production and consumption activities when using raw materials.
- Secure the improvements in our natural environment that we have made through regulation and investment.
- Integrate measures to protect against radon into our built environment.
- Leverage a growing public engagement with environmental issues.
- Act on the highlights identified in 'Ireland's Environment - An Integrated Assessment 2020'. Covering thematic, sectoral and integrated areas, these highlights outline the scale of the challenges to be tackled.

3.2 Environmental Characteristics

The baseline environmental information and status of relevance to the NI FRMP was described in Section 4 of the SEA Environmental Report for the 1st cycle NI FRMPs, divided by topic into the issues requiring assessment under SEA legislation. This demonstrated the level of baseline environmental information used when assessing the potential impacts of implementing the NI FRMPs. The baseline information formed the indicators which the measures within the NI FRMPs had the potential to impact upon. This section updates the relevant baseline information for the 2nd cycle NI FRMP. Future variation in the indicators owing to implementation of the NI FRMP will be monitored as part of the NI FRMP and SEA review.

Included within the baseline environmental information is a consideration of "environmental problems relevant to the plan or programme", as required by Schedule 1 of the Environmental Assessment of Plans and Programmes Regulations (Northern Ireland) 2004. The NI FRMP for 2021-2027 will seek to solve existing problems, or reduce their effects, associated with flood risk in Northern Ireland.

3.2.1 Biodiversity, Flora & Fauna

Biodiversity is the variety of all plants and animals, and the communities that they form. The conservation of biodiversity is important in its own right. Humans are also dependent on biodiversity for the provision of ecosystem services such as clean air and water, food and shelter, as well as for the health and amenity value that the natural environment can provide.

The importance of preserving biodiversity has increasingly been recognised from an international to a local level, and Northern Ireland has legal obligations under International commitments and legislation. The UN Convention on Biological Diversity (1992) is an international legally-binding treaty with three main goals: conservation of biodiversity; sustainable use of biodiversity; and the fair and equitable sharing of the benefits arising from the use of genetic resources. It requires the development of national strategies for the conservation and sustainable use of biological diversity. The most recent biodiversity strategy for the EU (EU Biodiversity Strategy to 2030) was published in 2020. It aims to put Europe's biodiversity on the path to recovery by 2030 for the benefit of people, climate and the planet, and to build societies' resilience to future threats such as climate change impacts, forest fires, food insecurity and disease outbreaks. The Strategy contains specific commitments and actions to be delivered by 2030.

The most recent Biodiversity Strategy for Northern Ireland, "Valuing Nature", was published by DAERA in 2015 and covered the period up to 2020. This set out how Northern Ireland planned to meet its international obligations and local targets to protect biodiversity, and to ensure that the environment can continue to support the population and economy of Northern Ireland. Its overall mission was "To make progress towards halting overall biodiversity loss, establish an ecosystem approach and help business and society in general have a greater understanding of the benefits that nature can bring to everyday life in Northern Ireland".

The NI FRMP must also have regard for the Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 (as amended) "the 1995 Regulations", and the Conservation (Natural Habitats, etc.) (Amendment) (Northern Ireland) (EU Exit) Regulations 2019 "the 2019 Regulations", which provide a framework for the legal protection of habitats and species of international importance within Northern Ireland. The 1995 Regulations transposed the Habitats Directive and certain elements of the Wild Birds Directive (Directive 2009/147/EC), together termed the "Nature Directives" into Northern Ireland legislation. The 2019 Regulations, required to ensure that the 1995 Regulations remained operable following the UK's exit from the EU, created a national site network within the UK, comprising the protected sites already designated under the Nature Directives, and any further sites designated under these Regulations. It is also Northern Ireland Government policy to afford Ramsar sites the same protection as European sites. The protection of European sites within the Republic of Ireland is underpinned by the European Communities (Birds and Habitats) Regulations 2011 (RoI S.I. No. 477 of 2011). Together these Regulations require that any plan or project not directly connected with or necessary to the management of a European site but likely to have a significant effect on such a site, must undergo an appropriate assessment in view of best scientific knowledge and in view of the conservation objectives of the site. The NI FRMP falls under this remit, and a Habitats Regulations Assessment (HRA) is being undertaken to assess the potential implications of the Plan for European Sites.

It is considered that the key issues associated with implementation of the NI FRMP and Biodiversity, Flora and Fauna comprise:

- Potential for effects on protected areas, including those of international (SACs, SPAs, Ramsar Sites), national (ASSIs, NNRs) and local (SLNCI) importance;
- Potential for negative effects on biodiversity, flora and fauna from construction of flood management infrastructure - potential for habitat loss, fragmentation or deterioration, effects on species including priority species, potential for the spread of invasive non-native species (temporary or permanent effects);
- Potential for positive effects on water-dependent habitats and species from protection afforded by flood management measures against flooding-related impacts (e.g. contaminants associated with flood waters), and
- Potential for habitat creation or enhancement with benefits for biodiversity, flora and fauna.

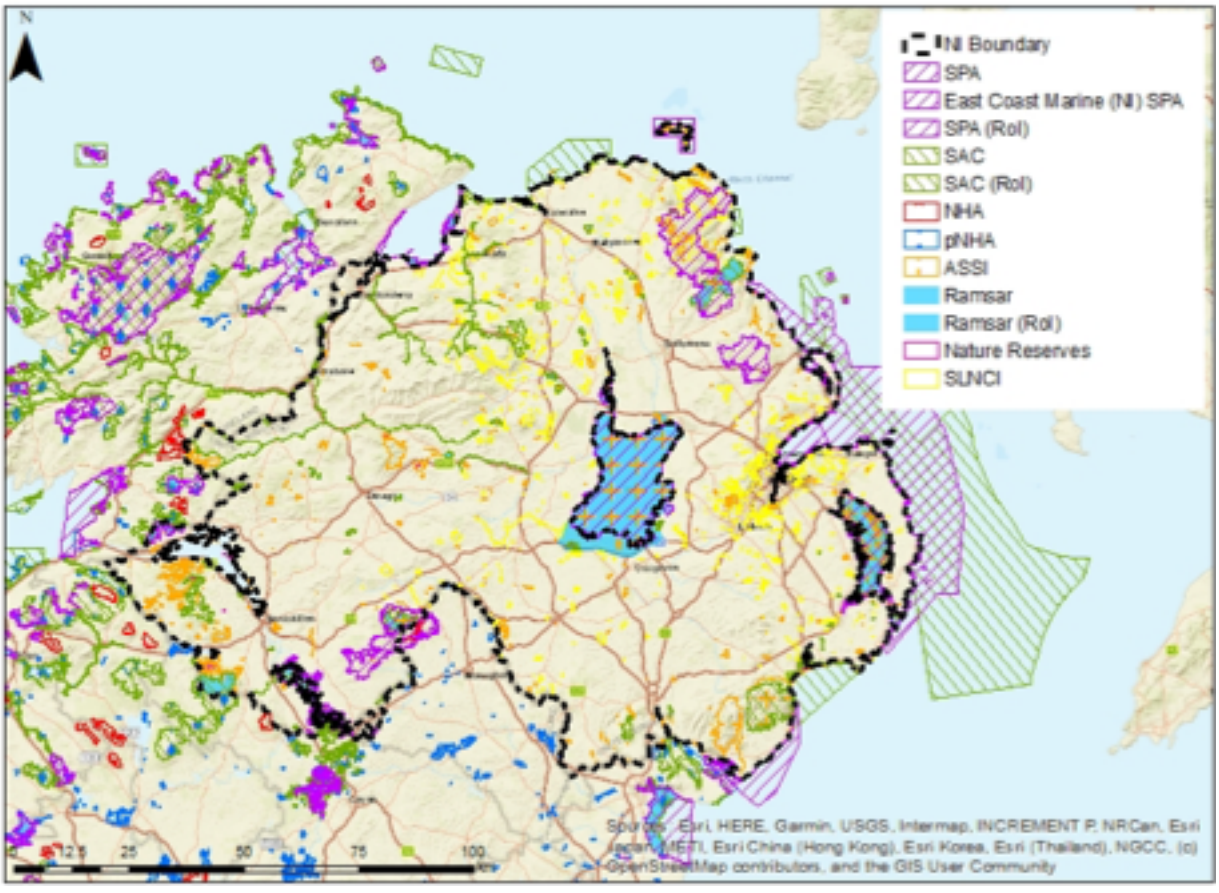
3.2.1.1 Designated Sites

3.2.1.1.1 Overview of Designated Sites

There are a wide variety of natural habitats and species within Northern Ireland. The NIEA has compiled a list of those habitats and species considered to be priority, on the basis of their listing as a UK Priority Habitat[5]/Species[6] or importance in an all-Ireland context, and current downward trends; the most recent lists comprise 51 Northern Ireland Priority Habitats, and 481 species.

Sites have been designated in order to provide protection to those habitats and species considered to be of particular conservation value. These include features whose conservation is considered to be of importance at a European level, for which 59 Special Areas of Conservation (SACs), 16 Special Protection Areas (SPAs), and 20 Ramsar Sites have been designated, to date. Northern Ireland has 49 habitats listed in Annex I of the Habitats Directive, of which 13 are considered to be priority habitats at a European level, and 18 species listed in Annex II of the Directive. At a National level, 394 Areas of Special Scientific Interest (ASSIs) and 50 statutory Nature Reserves have been designated to provide protection to features considered to be of national importance, while 728 sites have been designated for their importance at a more local level (SLNCIs). These designated sites in Northern Ireland are detailed in **Table 3-3** and their locations shown in **Figure 3.1**.

Figure 3.1: Designated sites across Northern Ireland and the border regions with the Republic of Ireland



[5] https://www.daera-ni.gov.uk/publications/northern-ireland-list-priority-habitats

[6] https://www.daera-ni.gov.uk/articles/northern-ireland-priority-species

Table 3-3: Number and type of sites designated for conservation of Biodiversity, Flora and Fauna in Northern Ireland

Site Designation	Description	Number
Special Areas of Conservation (SACs)	Existing SACs in Northern Ireland were designated in accordance with the Habitats Directive (92/43/EEC) for the conservation of certain habitats and species while SPAs were designated under the EU Directive on the Conservation of Wild Birds (EC/79/409), "The Birds Directive", as areas that are important for breeding, feeding, wintering or migration of rare and vulnerable bird species. Together these formed part of the Natura 2000 network of protected sites. Following the UK's exit from the EU, there is now a UK National Site Network, comprising existing designated sites and any further sites designated under the Habitats Regulations. SACs and SPAs in the Republic of Ireland remain part of the Natura 2000 site network.	59
Special Protection Areas (SPAs)		16
Ramsar Sites	Ramsar sites are designated under the "Ramsar Convention" (Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat, Iran 1971), an international treaty for the conservation and sustainable use of wetlands.	20
Areas of Special Scientific Interest (ASSIs)	ASSIs are protected under the Environment (Northern Ireland) Order 2002. This requires NIEA to designate land as an ASSI that it considers to be of special scientific interest, owing to the flora or fauna present, or the presence of geological features	394
National Nature Reserves	Statutory Nature Reserves are areas of importance for flora, fauna, geological or other special features for conservation purposes and to provide the opportunity for research. They are designated under the Nature Conservation and Amenity Lands (Northern Ireland) Order 1985.	50
Sites of Local Nature Conservation Importance (SLNCIs)	Each council area in NI reports on locally important sensitive or valued habitats through the production of Local Biodiversity Action Plans (LBAPs). These Plans outline the areas of importance for natural heritage reasons within the council area, guiding development policy and potential enhancement of local biodiversity. These areas are known as SLNCIs.	728

3.2.1.1.2 Status and Trends for Sites Designated at a European Level

Article 17 of the Habitats Directive requires that, every six years, all EU Member States report on the implementation of the Directive, including on the conservation status of habitats and species (informally known as the Article 17 report). The 4th UK Habitats Directive Report was submitted to the European Commission in August 2019, and included a General Implementation Report, Habitat Reports and Species Reports. These outlined any changes in designated habitats and species, for the UK as a whole, in the period 2013-2018[7].

The status of designated habitats, as summarised from the 2019 reports is as follows:

- For 6 habitats, the overall conservation status was "Favourable";
- For 8 habitats, the overall conservation status was "Inadequate";
- For 62 habitats, the overall conservation status was "Bad"; and
- For 1 habitat, the overall conservation status was "Unknown".

Of these, 22 habitats showed improvement in overall conservation status, 29 habitats showed no change, 22 habitats showed a decline, and 4 were uncertain in comparison with the results of the 3rd UK Habitats Directive Report.

The status of designated species, as summarised from the 2019 reports is as follows:

- For 33 species, the overall conservation status was "Favourable";
- For 24 species, the overall conservation status was "Inadequate";
- For 16 species, the overall conservation status was "Bad"; and
- For 20 species, the overall conservation status was "Unknown".

Of these, 9 species showed improvement in overall conservation status, 47 showed no change, 12 showed decline and 25 were uncertain in comparison with the results of the 3rd UK Habitats Directive Report.

Article 12 of the Birds Directive requires that, every six years, all EU Member States report on the implementation of the Directive. The 11th UK Report for Article 12 of the EU Birds Directive was submitted to the European Commission in October 2019. The report format includes both a General Report on the implementation of the Directive (Annex A), and a Bird Species Status and Trends Report containing individual assessments for all relevant bird species (Annex B).

Following the UK's exit from the EU, reporting to the European Commission will no longer be required, however DAERA will report periodically every 6 years following exit from the EU. The first of these reports is due in 2026.

3.2.1.1.3 Status and Trends for Sites Designated at a National Level

Northern Ireland launched its first State of the Environment Report in 2008, containing 30 indicators that were designed to assist future comparison and measurement of the changing

[7] https://jncc.gov.uk/our-work/article-17-habitats-directive-report-2019-habitats/

environment. The last full State of the Environment Report for Northern Ireland was published in 2013 and, in the interim period, the NIEA has published annually a Northern Ireland Environmental Statistics Report, providing annual reports on a range of environmental indicators. The most recent report is for 2021[8] , and Section 5 provides key information regarding the current status of biodiversity indicators in NI.

Monitoring of the condition of features within Areas of Special Scientific Interest (ASSI) for the six year rolling period ending March 2020 indicated that:

- 61% of features were in a Favourable condition; and
- 36% of features were in an Unfavourable condition.

When this is partitioned into the biological and earth science features assessed, 54% of biological features were in favourable condition, compared to 97% of earth science features in favourable condition, reflecting the greater pressures on the natural environment.

These results remain very similar to the previous 10 years of reporting. NIEA is aiming to achieve favourable condition for a much higher proportion of the ASSI network, and there is now a focus on improving the overall condition of sites towards "favourable conservation status (FCS)" through effective land management to support recovery of the special features within the site. The Environmental Statistics Report 2021 states that, in 2020/2021, the area of terrestrial protected sites under favourable management in NI was 304.04km^2, a significant increase since the baseline year for reporting (2015/2016) when just 2.63km^2 of terrestrial sites were under favourable management.

The area of marine protected sites under favourable management in 2019/20 was recorded as 115km^2, which has increased since the baseline year for PfG reporting (2015/16) when 83.62km^2 of marine protected sites were under favourable management. The focus between 2018 and 2022 is on bringing the protected area network into favourable management, through identification and introduction of necessary management measures for marine protected areas.

3.2.1.2 Water-Dependent Habitats and Species at Risk of Water Pollution

The Water Framework Directive (WFD) (2000/60/EC), transposed in Northern Ireland through The Water Environment (Water Framework Directive) Regulations (Northern Ireland) 2017, required Member States to develop a Register of Protected Areas comprising lands that have been designated as requiring special protection under specific Community legislation for protection of surface water or groundwater, or for conservation of habitats and/or species that depend upon water. These components, which had to be established for each River Basin District (RBD), are outlined in Annex IV of the WFD, and include sites that are used for water abstraction, those designated for salmonids, those designated for bathing, those designated for shellfish production, nutrient sensitive areas, and those designated "for the conservation of habitats and species directly depending on water". The Water (Amendment) (Northern Ireland) (EU Exit) Regulations 2019 ensure that the WFD (as transposed) and the various supporting pieces of water legislation continue to operate in Northern Ireland after 1 January 2021.

[8] https://www.daera-ni.gov.uk/sites/files/publications/daera/ni-environmental-statistics-report-2021.pdf

3.2.1.2.1 Water-dependent UK National Site Network Sites

Where a UK National Site Network (NSN) site (SAC or SPA) lies within a water body, the WFD status objectives apply in addition to the requirement to maintain the site at favourable conservation status or restore it to that status. **Table 3-4** details the surface water-dependent National Site Network sites within the North Eastern, North Western and Neagh Bann RBDs. For the draft 3rd cycle RBMP 2021-2027[9] , a total of 27 water-dependent National Site Network sites were identified for the North Western RBD. Of these, 81% are currently in unfavourable, and for 30% of sites this is due, at least in part, to pressures from the water environment. In the Neagh Bann RBD there were 24 water-dependent National Site Network sites; of these 75% are currently in unfavourable condition, and for 25% this relates to water pressures. A total of 25 water-dependent National Site Network Sites were identified for the North Eastern RBD, of which 56% are currently in unfavourable condition, with 12% of sites due to water pressures.

For Northern Ireland as a whole, 71% of water-dependent National Site Network sites are currently in unfavourable conservation condition (i.e. failing to meet their conservation objectives), however these failures relate to pressures from the water environment in 23% of sites.

Table 3-4: Surface water-dependent National Site Network Sites in unfavourable condition owing to pressures from the water environment.

	NWRBD		NBRBD		NERBD		Northern Ireland	
	No	%	No	%	No	%	No	%
Number of sites	27	100	24	100	25	100	66*	100
Number of sites in unfavourable condition	22	81	18	75	14	56	47	71
Number of sites in unfavourable condition due to pressures from the water environment	8	30	6	25	3	12	15	23

*Note: some protected sites straddle more than one RBD, hence the NI total does not equal the sum of the RBDs.

3.2.1.2.2 Areas Designated to Protect Economically Significant Aquatic Species

Shellfish water protected areas **(Figure 3.2)** are areas designated for the protection of shellfish growth and production. Good water quality within these areas is important for the production of high-quality shellfish. Both the Shellfish Directive (79/923/EEC) and Freshwater Fish Directive (78/659/EEC) were revoked in 2013 and subsumed into the WFD. Areas previously designated under these Directives are now areas designated for the protection of economically significant aquatic species under the WFD Regulations and listed on the Protected Areas register.

Within the North Eastern RBD, 662km of rivers, 5.5km^2 of canals and 2km^2 of lakes are designated for fish[10]. In the North Western RBD, there are 1681km of rivers and 149km^2 of lakes designated for fish[11]. In the Neagh Bann RBD, there are 1936km of rivers, 43km of canals and 292km^2 of lakes

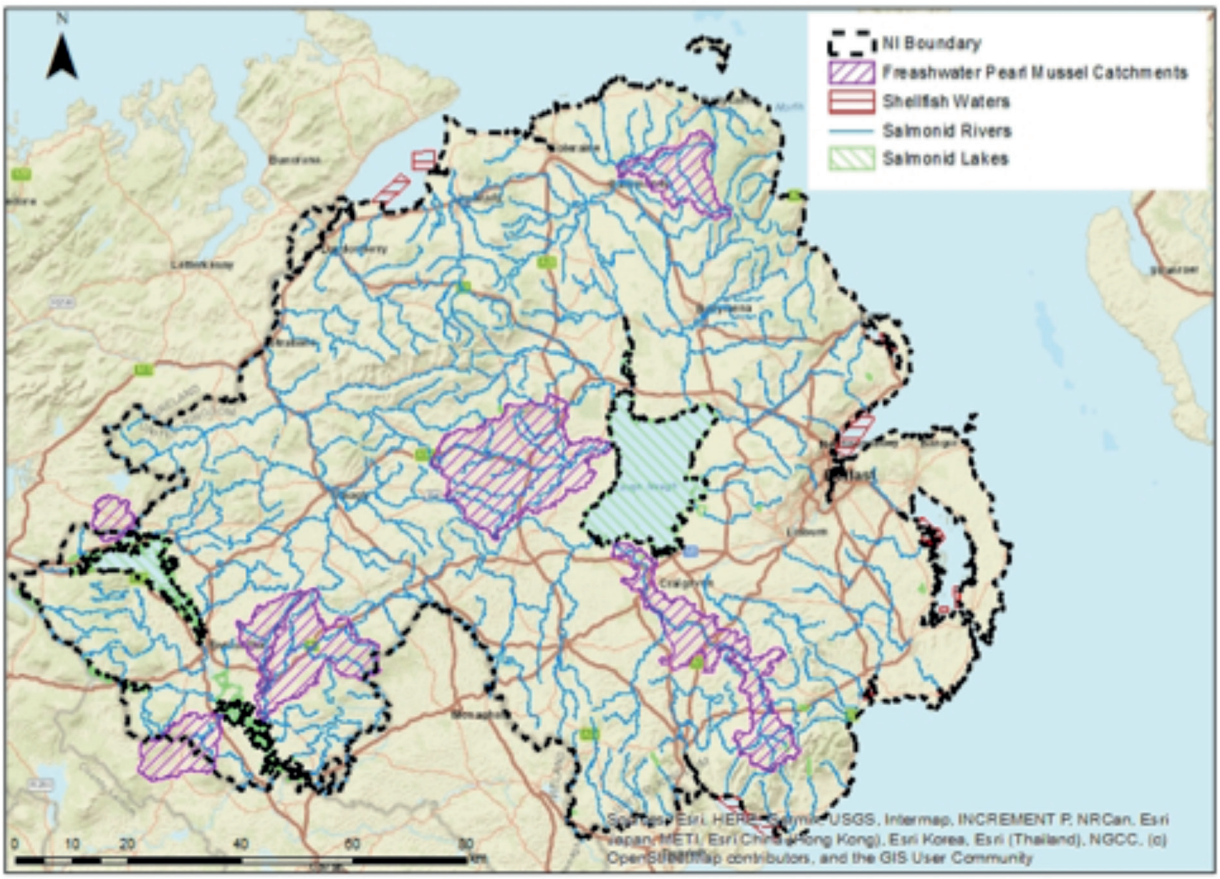
[9] https://www.daera-ni.gov.uk/sites/default/files/consultations/daera/Draft%203rd%20cycle%20River%20Basin%20Management%20Plan%20for%20Northern%20Ireland%202021-2027_0.PDF

[10] https://www.daera-ni.gov.uk/publications/north-eastern-river-basin-management-plan-2015-2021

[11] https://www.daera-ni.gov.uk/sites/default/files/publications/doe/water-report-north-western-river-basin-plan-2015.pdf

designated for fish[12]. In Northern Ireland as a whole, 20 lakes and 413 rivers have been designated as salmonid waters **(Figure 3.2)**.

Figure 3-2: Designated Freshwater Pearl Mussel sites, Shellfish Waters and Salmonid waters across Northern Ireland



3.2.1.3 Summary of Existing Pressures and Issues for Biodiversity, Flora and Fauna in Northern Ireland

Despite an increase in actions to halt biodiversity loss, many elements of biodiversity in Northern Ireland are continuing to show declines[13]. Impacts of human activities, particularly landuse change associated with agriculture and development, pollution and fisheries (particularly in the marine environment) are key pressures affecting biodiversity in Northern Ireland. Invasive non-native species are also a significant threat to native biodiversity. Development such as housing and infrastructure associated with population growth has contributed to a loss of terrestrial and freshwater habitats, with over 40,000 hectares of countryside lost through urban development since the 1950s.

Priority habitats in Northern Ireland have shown an overall decline since 2000, while a significant number of priority species such as breeding waders are also showing declines14. The latest UK Article 17 reporting (in 2019) for habitats and species whose conservation is important at an

[12] https://www.daera-ni.gov.uk/sites/default/files/publications/doe/water-report-neagh-bann-river-basin-plan-2015.pdf

[13] https://www.daera-ni.gov.uk/sites/default/files/publications/doe/corporate-report-from-evidence-to-opportunity-second-assessment-of-state-of-ni-environment-2013.pdf

international level found that only 6% of habitats and 35% of species are currently at a favourable conservation condition, and that 22 habitats and 12 species showed a decline in condition since the previous reporting period. Monitoring of features within nationally protected sites has shown that just 55% of biological features are in a favourable condition.

Implementation of the 2nd cycle NI FRMP, and measures therein, has the potential to lead to positive or negative effects on biodiversity in Northern Ireland alone, or in combination with, these existing pressures. There is potential for positive or negative effects on habitats and species through both direct and indirect pathways, including the potential for positive or negative effects on the condition of habitats and species protected at a national and international level.

There is potential for short-term negative effects from construction of flood management infrastructure such as direct or indirect habitat loss or fragmentation, and effects on water-dependent habitats and species via sedimentation, contamination or the spread of invasive species. However, the potential for positive effects from implementation of measures within the FRMP include the protection of habitats and species from flooding, and the contaminants or potential for spread of species outside their natural range that may be associated with these events. In addition, there is potential for habitat creation or enhancement, such as through natural flood management and catchment rewetting schemes and increased urban blue-green infrastructure, that could provide benefits for biodiversity, flora and fauna.

3.2.2 Population & Human Health

Population and human health considers the presence and wellbeing of people, and their activities and use of receiving environments. Population size, growth predictions and distribution within an area can indicate both the potential pressures that people may exert on resources and infrastructure, and the potential to which they may be exposed to pollution, flooding or other risks. Health of a population can be adversely affected through a number of direct and indirect pathways, including risk to life, effects of exposure to water and air contaminants and effects on mental health.

It is considered that the key issues associated with implementation of the NI FRMP and Population and Human Health comprise:

- Protection from risk to life from flooding;
- Protection from risks to human health from contaminants associated with flooding;
- Protection from mental health effects associated with flooding;
- Effects of flooding on vulnerable or deprived groups;
- Potential for noise, visual or access disturbance during construction of flood management schemes; and
- Potential for positive effects on the health or living environment of communities through the creation of integrated water management infrastructure or restoration of habitats (e.g. blue-green spaces to hold flood waters in urban areas and upper catchment management measures).

3.2.2.1 Population Demographics for Northern Ireland

The total population of Northern Ireland in 2020 was approximately 1.90 million people[14] , and is predicted to increase to approximately 1.99 million individuals by 2043[15] . Population growth has been positive for the past 25 years, and over the decade from mid-2010 to mid-2020 increased at an annual growth rate of 0.5%. The period from mid-2019 to mid-2020 showed the lowest level in population growth in over 20 years, at 0.1%, influenced by the Covid-19 pandemic and the EU Exit and their effects on the death rate and net migration[14].

The population density of Northern Ireland in 2020 was 139.8 people per km^2, varying across the Local Government Districts, and with a more dispersed population in rural areas. Rural populations in Northern Ireland are defined by their distance to Belfast, as the largest urban centre, as this tends to govern the type of rural land use that occurs as well as access to urban employment and to various services. The population of Northern Ireland estimated to be living in urban and rural areas in 2019 is shown in **Table 3-5**.

Table 3-5: Northern Ireland population in Urban and Rural Areas, 2019

Urban / Rural	No.	%
Urban	1,128,725	60%
Rural <= 60 mins from Belfast	432,334	23%
Rural > 60 mins from Belfast	244,687	13%
Mixed urban / rural	87,945	5%

In 2017-2019, life expectancy at birth was 78.8 years for men and 82.6 for women living in Northern Ireland[16], an increase from 69 and 76, respectively, since the base reporting period of 1980-1982. Northern Ireland has an ageing population, with 16.9% aged over 65 years, and it is projected that the over 65 year population will be larger than the number of children (0-15 years) from mid-2028 onwards[17]. The primary causes of death for people in Northern Ireland in 2019 were cancer (28.4%, most commonly in the lung) and circulatory (23.4%), followed by respiratory (12.5%), Alzheimer's / dementias (12.3%) and other causes (17.5%)[18].

[14] https://www.nisra.gov.uk/sites/nisra.gov.uk/files/publications/MYE20-Bulletin.pdf
[15] https://www.nisra.gov.uk/statistics/births-deaths-and-marriages/registrar-general-annual-report
[16] https://www.health-ni.gov.uk/news/life-expectancy-northern-ireland-2017-19
[17] https://www.nisra.gov.uk/sites/nisra.gov.uk/files/publications/MYE20-Bulletin.pdf
[18] https://www.nisra.gov.uk/statistics/births-deaths-and-marriages/registrar-general-annual-report

3.2.2.2 Flooding and health risks

The Northern Ireland Flood Risk Assessment (NIFRA) 2018[19] (expanded upon in Section 3.2.4 Water) provided a strategic assessment of flood risk within Northern Ireland and assessed the potential for impacts on a wide range of 'Flood Receptors' that together determine the impacts on human health, the environment, cultural health and economic activity in terms of severity, exposure and economic damages. Those used to assess the risk to population and human health included the number of residential properties (based on an average of 2.5 persons residing in each) and the risk to key infrastructure such as hospitals and public services. Overall, approximately 45,000 or 5% of properties in Northern Ireland are located within either the 1% AEP fluvial floodplain or the 0.5% AEP coastal floodplain or are sited in areas at risk of flooding from a 0.5% AEP pluvial event with a flood depth greater than 300mm. On the basis of 2.5 persons within each residential property, this relates to approximately 112,500 persons at risk of flooding.

In addition to immediate effects of flooding, such as risk to life and property, flooding can pose a risk to human health from exposure to contaminants within flood waters and can also lead to significant social or mental health problems in the longer term. In addition to the primary stressor of being flooded, secondary stressors (those indirectly related to the flood event, such as economic stress that may be associated with rebuilding of properties) are recognised as important in prolonging the psychosocial impacts of flooding (Stanke et al., 2012)[20]. The effects of climate change are predicted to increase flood occurrence, with projected increases in precipitation likely to increase both the frequency and severity of flooding. Hence, flood related risks to people and their health is anticipated to increase within Northern Ireland, and indeed globally.

3.2.2.3 Vulnerable or deprived groups in Northern Ireland

Spatial measures of deprivation have been used to inform policy and target areas of need in Northern Ireland since the 1970s. The Northern Ireland Multiple Deprivation Measure (NIMDM) was updated in 2017, replacing the NIMDM 2010 as the official measure of deprivation in Northern Ireland[21]. This provided information on seven distinct types of deprivation (income deprivation, employment deprivation, health deprivation and disability, education, skills and training deprivation, access to services, living environment, crime and disorder), along with an overall multiple deprivation measure (MDM). It provides a means for ranking areas within Northern Ireland in the order of the most deprived to the least deprived. Of the 100 most deprived spatial areas assessed (known as Super Output Areas, or SOAs), 50 are in Belfast, accounting for 29% of all SOAs in Belfast; five of the ten most deprived SOAs are in Belfast, the other five in Derry City and Strabane. Of the 100 most deprived SOAs, only five are classified as rural.

Within Northern Ireland there are several areas which can be considered socially sensitive. There are 22 peace lines constructed as barriers separating neighbourhoods from one another, which have been built at urban interface areas in Belfast (16), Derry/Londonderry (3), Portadown (2) and Lurgan (1). There are 36 Neighbourhood Renewal Areas in Northern Ireland, which have been identified as

[19] https://www.infrastructure-ni.gov.uk/sites/default/files/publications/infrastructure/northern-ireland-flood-risk-assessment-report-2018-updated-may2019.pdf

[20] http://currents.plos.org/disasters/index.html%3Fp=1947.html

[21] https://www.nisra.gov.uk/statistics/deprivation/northern-ireland-multiple-deprivation-measure-2017-nimdm2017

being deprived areas. Neighbourhood Renewal Partnerships have been key to creating local plans to improve everyday life for people in those areas. These areas are found throughout Northern Ireland, although higher densities are found in Belfast and Derry/Londonderry.

According to the WHO (2013)[22], certain population groups are more at risk than others for morbidity and mortality associated with flooding. These include people with limited physical capacity or mobility, those who rely on medication, home care or regular visits to health care facilities, those with weak social networks, with poor flood awareness, with few resources or with little access to flood warnings. In deprived communities, issues associated with flooding may be more significant owing to links with poor flood awareness, a lack of resources to insure, protect or repair properties, weaker social networks, a poorer baseline health and a lack of mobility or physical capacity (WHO, 2013).

3.2.2.4 Summary of Existing Pressures and Issues for Population and Human Health in Northern Ireland

According to the current State of the Environment report (2013), air and water quality pose little overall risk to public health in Northern Ireland[23] . Risks from radioactivity exposure are also considered very low and, while the health impacts of hazardous chemicals is not fully known, recent legislation regulating chemical supply and use ensures increased safeguarding of the population from health risks. The report considers noise to be an emerging environment and health issue, as well as the effects of climate change, depletion of stratospheric ozone, biodiversity loss and land degradation.

Construction activities associated with the development of flood management infrastructure may lead to short term disturbances, disruption and nuisance to local communities, with the potential for impacts most significant in socially sensitive areas. However, implementation of the NI FRMP, and measures therein, has the potential to lead to positive effects on the population and their health, by providing protection to people against the effects of flooding. This includes both short-term effects, through protection against mortality, and exposure to contaminants associated with flood waters and longer-term, through protection against secondary stressors that can be associated within flooding.

3.2.3 Geology, Soils & Landuse

Soils are a non-renewable resource, which provide vital ecosystem services such as filtration and transformation of nutrients; storage of carbon; regulating flows and storing surface water; providing habitats and supporting biodiversity and food production. Depending on their condition and landuse, soils may be degraded, disturbed or lost through activities which result in compaction, poaching, erosion, sediment loss or changes in fertility.

Geology and soils, and their associated landuse, provide potentially important pathways for the movement of contaminants. This is particularly important for underlying geology of higher

[22] https://www.euro.who.int/__data/assets/pdf_file/0020/189020/e96853.pdf

[23] https://www.daera-ni.gov.uk/sites/default/files/publications/doe/corporate-report-from-evidence-to-opportunity-second-assessment-of-state-of-ni-environment-2013.pdf

vulnerabilities, such as karstic limestone formations which may be particularly sensitive to emissions of contaminants or may be more susceptible to transporting contaminants in base flow to downstream areas. This susceptibility of groundwater to contaminants is dependent on the type of soil, the depth and permeability of the subsoil, as well as the nature of the underlying bedrock aquifer i.e. regionally important productive aquifers versus poorly productive aquifers.

It is considered that the key issues associated with implementation of the NI FRMP and Geology, Soils and Landuse comprise:

- Potential for effects on sites designated for earth science features;
- Potential for disturbance or loss of soils during construction of flood schemes; and
- Potential for contamination of soils during construction of flood schemes.

3.2.3.1 Geology of Northern Ireland

3.2.3.1.1 Bedrock Geology

The geological landscape of Northern Ireland is remarkably varied considering its relatively small area of about 14,000km^2, and is a reflection of the diverse geology on which it has been shaped. Northern Ireland has widespread geological deposits of relatively recent origin, known as superficial deposits, which formed during the last 2-3 million years of the Earths' history, spanning the Ice Ages and Interglacial periods. By far the most abundant of these are glacial sediments, made of mixtures of clay, silt, sand and gravel that were laid down by the repeated growth and decay of former ice-sheets. Other sediments continue to form in lakes, rivers, estuaries and coastlines, whilst on high ground raised bogs of peat have steadily accumulated[24].

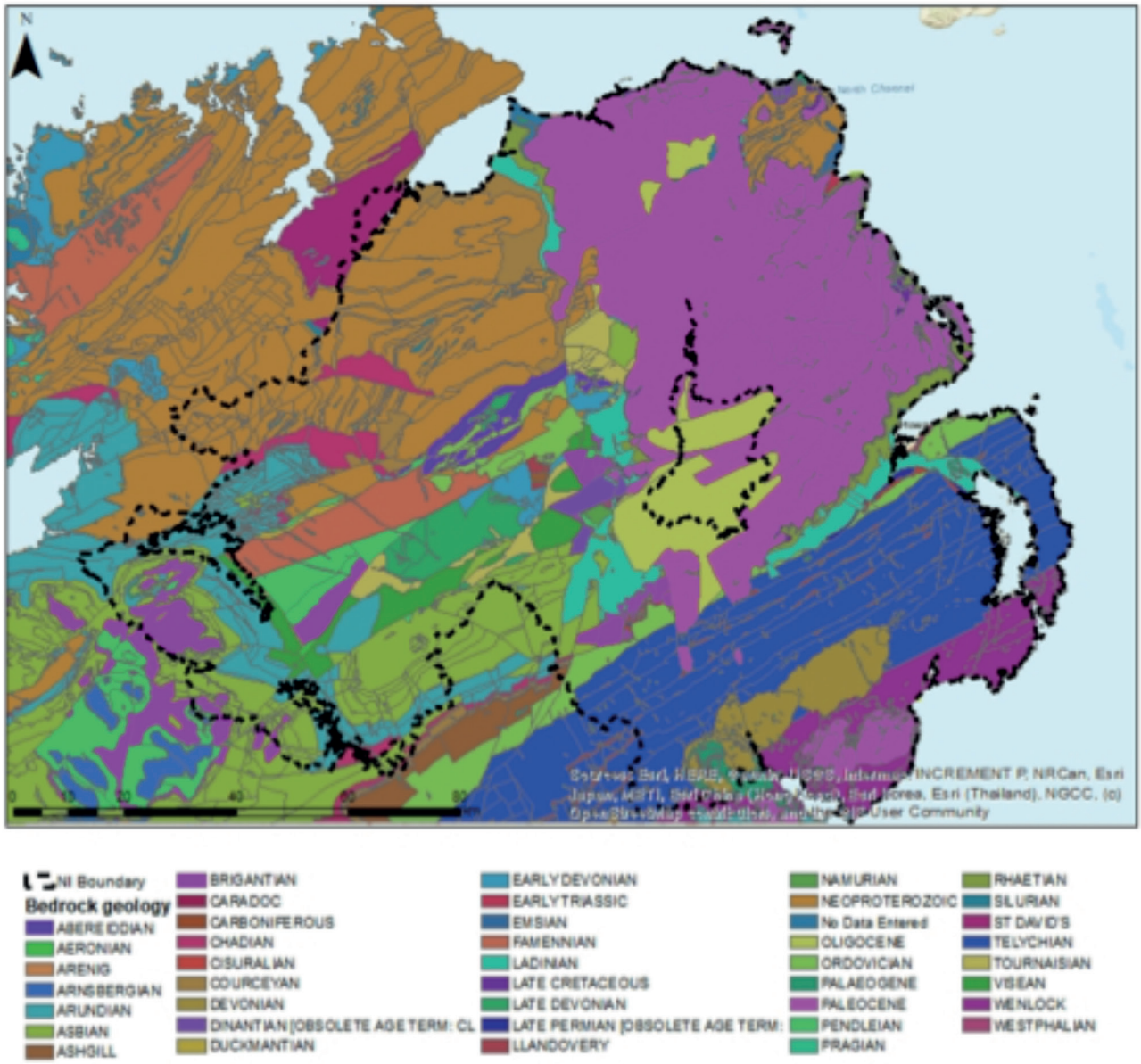
Below the superficial deposits, or with just a cover of soil where such deposits are absent, are older rocks which geologists broadly split into two distinct types: sedimentary bedrock and basement bedrock. Sedimentary bedrock geology consist of younger sequences, including limestones, sandstones and clays and older sequences, including sandstones, siltstones and mudstones. Basement geology (which underlies the sediment geology), consists of rocks which formed from the solidification of molten rock below volcanoes (igneous rocks) and sediments or intrusions which have changed as a result of high temperatures and pressures (metamorphic rocks). At a high level, the bedrock geology of Northern Ireland **(Figure 3.3)** can be separated into four contrasting areas from oldest to youngest:

- The Sperrin Mountains in Londonderry and Tyrone contain the oldest basement rocks (Neoproterozoic);
- The Down-Longford area to the southeast is composed of basement rocks (Rhuddanian);
- The Lakelands in the southwest are predominantly a combination of various Palaeozoic sedimentary bedrock; and
- The Antrim Hills in the northeast contain the youngest sedimentary bedrock (Paleocene).

[24] https://www.bgs.ac.uk/download/regional-geological-summaries-northern-ireland/

This correlates with groundwater aquifers, as Northern Ireland contains four major aquifers. Three of these are layers within the younger sedimentary rocks of the Antrim Plateau, while the other is within the older sedimentary rocks in the southwest. There are no major aquifers in the northwest or the southeast, given that basement bedrock are the primary features in these areas.

Figure 3-3: Bedrock geology mapping across Northern Ireland by age



3.2.3.1.2 Hydrogeology and Groundwater Vulnerability

Basement rocks, such as those found in The Sperrin Mountains and in the Down-Longford terrane, do not usually provide a water source except where intensely fractured and weathered near the surface, and so the nature of the rock types most commonly found is such that they generally represent only poorly to moderately productive aquifers.

As previously noted, there are four major aquifers across Northern Ireland, one of which is located within the older sedimentary bedrock in the southwest Lakelands (Enniskillen) and the remaining three within the younger sedimentary bedrock, typically found in the north and northeast. Across Northern Ireland there are a total of 6 classes of aquifer, which are identified in **Table 3-6** and **Figure 3.4**.

Table 3-6: Aquifer classification of bedrock in Northern Ireland

Aquifer Category	Symbol	Typical Rock Units/ Formations
High productivity Fracture Flow	Bh (f)	Certain Carboniferous basal formations
High Productivity Fracture/Intergranular Flow	Bh (I-f)	Permo-Triassic Sandstones
High Productivity Fracture flow with karstic element	Bh (f-k)	Carboniferous Darty Limestone with Knockmore Limestone Member (in places) Carboniferous Ballyshannon Limestone Formation Ulster White Limestone Formation (Chalk)
Moderate Productivity Fracture Flow Limited Productivity Fracture Flow	Bm (f) Bl (f)	Palaeogene Basalts Certain Carboniferous Dinatian Sandstones Ordovician/Silurian strata Dalradian strata Devonian strata Granites and Intrusives
Poor Productivity Fracture Flow	Bp (f)	Lough Neagh Clay Group Mercia Mudstone Group Waterloo Mudstone Formation

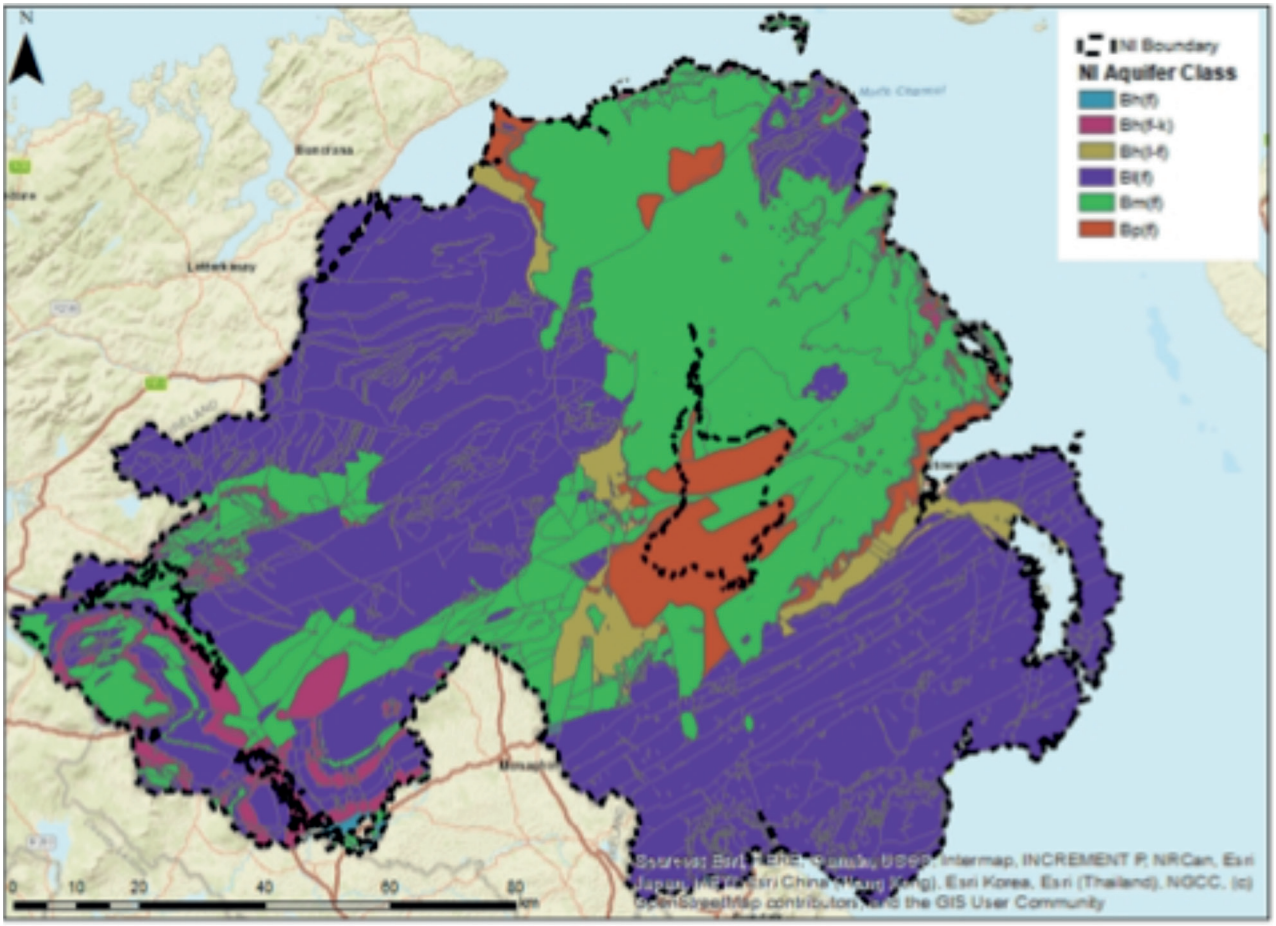


Figure 3-4: Aquifer classification across Northern Ireland

The tendency and likelihood for general contaminants to reach the water table after introduction at the ground surface is termed groundwater vulnerability. This vulnerability is therefore a combination of landuse and aquifer classification. Where the soil and unsaturated zone are highly permeable, water can readily flow from the surface to the water-table and the aquifer is vulnerable. However, if the unsaturated zone and soil is clay rich, recharge is reduced and the aquifer is less vulnerable. In Northern Ireland in general, the areas of highest groundwater vulnerability are those with bedrock outcrops present, or where glacial sand and gravels are present, particularly in areas of higher elevation.

3.2.3.2 Soil Types in Northern Ireland

Northern Ireland is dominated by relatively poorly draining soils and low permeability glacial deposits. A General Soil Map of Northern Ireland has been produced by the Agri-food and Biosciences Institute (AFBI)[25]. This map identifies 9 main soil types across Northern Ireland, as recognised by The World Reference Base map. These soils and their general occurrence are identified in **Table 3-7**.

[25] http://www.ukso.org/static-maps/soils-of-northern-ireland.html

Table 3-7: AFBI World Reference Base soil types across Northern Ireland

AFBI World Reference Base	General occurrence across Northern Ireland
Arenosols (sandy-textured soils that lack any significant soil profile development)	Located in coastal areas such as Murlough in County Down and Portrush in County Antrim
Cambisols (soil in the beginning of soil formation)	Most prevalent in the southeast, around County Down
Fluvisols (genetically young soil in alluvial deposits)	Generally widely dispersed across Northern Ireland in small pockets
Gleysols (wetland soils, which in the natural state are continuously water-saturated within 50 cm of the surface, for long periods of time)	Generally occur in small, isolated pockets across Northern Ireland
Histosols (soil consisting primarily of organic materials)	Generally present in the northwest, around the Sperrin Mountains and in the Antrim Hills
Leptosols (shallow soils with minimal development, formed typically on hard rock or highly calcareous materials)	Generally most prevalent in the southeast, around the Mourne Mountains and surrounding Strangford Lough
Podzols (soils with an ash-grey subsurface horizon, bleached by organic acids, on top of a dark accumulation horizon with brown or black illuviated humus and/or reddish iron compounds)	Most prevalent in the southeast and west
Stagnosols (soil with strong mottling of the soil profile due to redox processes caused by stagnating surface water)	Most abundant soil type, which is present across Northern Ireland but most dominant in the south and southwest
Urban (soil material having a non-agricultural, man-made surface layer more than 50 cm thick)	Mostly present around the Greater Belfast, Bangor and Lisburn urban areas.

3.2.3.3 Landuse in Northern Ireland

Landuse in Northern Ireland, as identified within the Corine Dataset, is shown in **Figure 3.5** and summarised in **Table 3-8**, which indicates that landuse across Northern Ireland is primarily composed of 'Pastures' (>7600km^2), followed by 'Complex Cultivation Patterns' (1,438km^2) and 'Peat Bogs' (1,321km^2). Pastures, which cover >56% of land cover across Northern Ireland are located across the country, with the exception of upland areas such as the Mourne Mountains in the southeast, the Antrim Hills in the Northeast, the Sperrins in the west and raised bog peatland areas in mid-Ulster. Complex cultivation patterns are generally located in the east of Northern Ireland, primarily surrounding Strangford Lough and peat bogs are generally located in western areas.

Figure 3-5: Corine landuse mapping across Northern Ireland

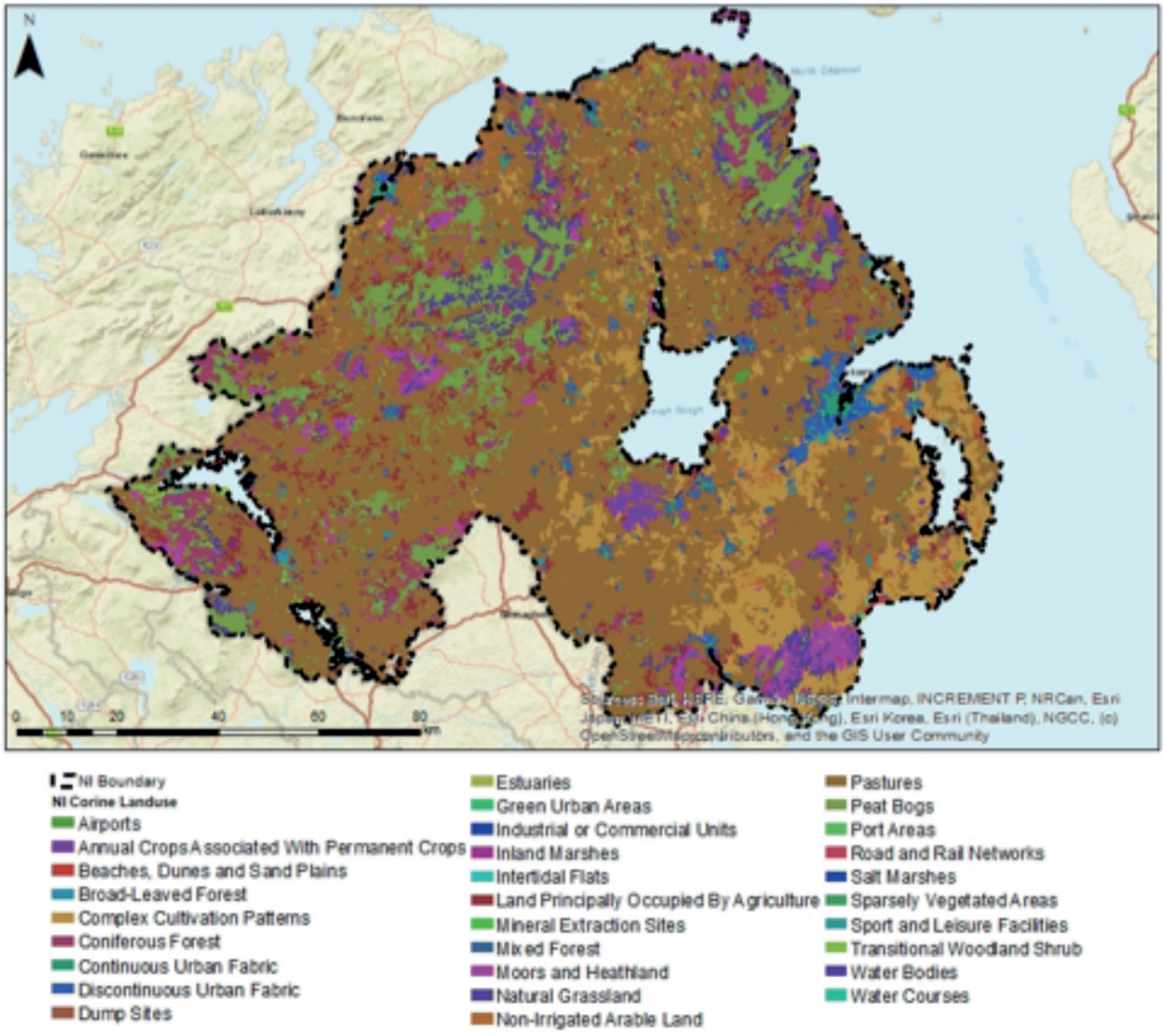


Table 3-8: Dominant Land Cover Types within Northern Ireland

Land Cover Class	Total Land Cover (km2)	% of Total
Pastures	7,624	56
Complex Cultivation Patterns	1,438	11
Peat Bogs	1,321	10
Land Principally Occupied by Agriculture	620	5
Natural Grassland	532	4
Coniferous Forest	521	4
Moors and Heathland	325	2
Non-Irrigated Arable Land	323	2

3.2.3.4 Designated sites and sensitive land types

There are currently 394 sites designated as ASSIs across Northern Ireland; of these 147 sites have been designated, at least in part, for their earth science interest. These may be considered as sites of geological heritage. The one UNESCO world heritage site in Northern Ireland, the Giant's Causeway, is designated for its unique geological heritage. The locations of these sites are shown in **Figure 3.6**.

Additional land types and land uses that may be constraints to the development of flood alleviation schemes include quarries, mines, landslide areas, unstable grounds, and potentially contaminated sites. There are over 230 active quarries within Northern Ireland, the majority of which extract sand and gravel, along with mines which extract limestone, basalt and igneous rock, and clay and shale. There are also 660 known historic mines within Northern Ireland. Landslides and unstable ground materials are present throughout the country and may provide unsuitable areas for stable foundations of infrastructure. Potentially contaminated sites include those from historic industrial operations and existing Pollution Prevention and Control (PPC) sites. There are over 14,500 potentially contaminated sites from historic operations and over 480 PPC sites within Northern Ireland. Development of infrastructure through or on these sites has the potential for mobilising contaminants to other areas, including into water bodies.

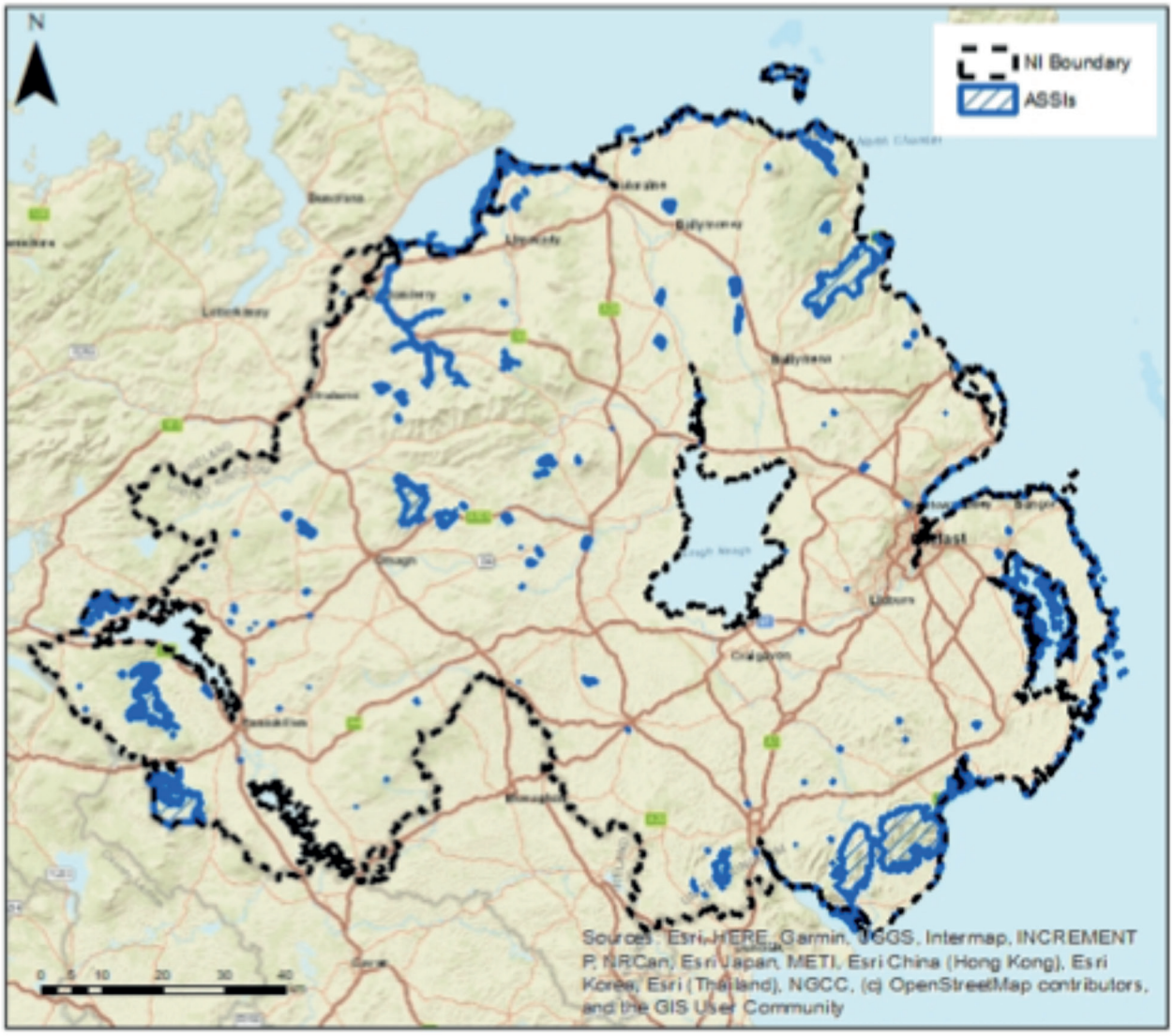


Figure 3-6 Sites designated for earth science interests in Northern Ireland

3.2.3.5 Summary of Existing Pressures and Issues for Geology, Soils and Landuse in Northern Ireland

The development of flood management infrastructure has the potential to impact on the identified geology and geological heritage sites, with the significance of any impact dependent on the sensitivity of the soils and land uses. Construction activities associated with the development of schemes may result in soil movement, which can lead to sedimentation and siltation of nearby watercourses, thereby impacting on water quality. Depending upon the soil and geological composition of the area, this can have medium to long term impacts in some cases, as erosion can continue after construction has been completed. The development of flood management infrastructure may also lead to the direct loss of soils or geological features from construction works, or their contamination from cement or fuel spills during works, or the accidental transfer of materials along a construction corridor from contaminated sites.

3.2.4 Water

Water is essential for the maintenance of biodiversity, supports the population through the provision of drinking water and supports many of our core activities[26]. Although there have been improvements in drinking water quality and water utility discharge quality, and a decrease in incidents of water pollution, the most recent status of WFD surface water bodies in Northern Ireland (2021) highlights that only 38% are currently at least of good status[27].

It is considered that the key issues associated with implementation of the NI FRMP and Water comprise:

- Potential for negative effects on the status of WFD surface water bodies from pollution or sedimentation associated with construction of flood management infrastructure;
- Potential for positive effects on the status of WFD surface water bodies from protection against contamination associated with flood events or rehabilitation associated with natural flood management;
- Potential for flood alleviation schemes to affect waterbody morphology; and
- Potential for flood alleviation schemes to protect against flooding and support the objectives of the Floods Regulations.

3.2.4.1 Water Framework Directive Surface Water Bodies in Northern Ireland

The EU Water Framework Directive (WFD) (2000/60/EC), transposed in Northern Ireland through 'The Water Environment (Water Framework Directive) Regulations (Northern Ireland) 2017' the "WFD Regulations", established a new legal framework for the protection, improvement and sustainable use of rivers, lakes, transitional waters, coastal waters and groundwater across Europe. This was undertaken in order to prevent deterioration and to enhance the status of aquatic ecosystems, promote sustainable water use and reduce pollution. The WFD is implemented through River Basin Management Plans (RBMPs). Northern Ireland has three River Basin Districts (RBDs): North Western RBD, Neagh Bann RBD and North Eastern RBD. The Water (Amendment) (EU Exit) Regulations 2019 ensure that the WFD (as transposed) and the supporting pieces of water legislation continue to operate in Northern Ireland following the UK's exit from the European Union in January 2021; as the preparation and implementation of a RBMP is a key part of the implementation of the WFD Regulations, this process will continue within Northern Ireland.

The WFD Regulations require the production and implementation of a RBMP for Northern Ireland in six yearly cycles. The most recent is the draft third cycle RBMP (2021), which runs from 2021-2027. This classifies the status of all WFD surface water bodies according to chemical, biological and hydromorphological parameters, providing an overall status of either 'High', 'Good', 'Moderate', 'Poor' or 'Bad' for each surface water body (if the surface water bodies have been designated as artificial or heavily modified, they are classified using ecological 'potential' rather than ecological

[26] https://www.daera-ni.gov.uk/sites/default/files/publications/doe/corporate-report-from-evidence-to-opportunity-second-assessment-of-state-of-ni-environment-2013.pdf

[27] https://www.daera-ni.gov.uk/sites/default/files/consultations/daera/Draft%203rd%20cycle%20River%20Basin%20Management%20Plan%20for%20Northern%20Ireland%202021-2027_0.PDF

'status'). 'Water Bodies' are the basic management units for reporting and assessing compliance with the environmental objectives of the WFD Regulations. There are 496 WFD surface water bodies in Northern Ireland, comprising 450 rivers, 21 lakes and 25 transitional and coastal waters, and there are 75 WFD groundwater bodies in Northern Ireland (66 bedrock and 9 superficial), comprised of 45 in the North Western RBD, 14 in the North Eastern RBD and 16 in the Neagh Bann RBD. Under the WFD, groundwater bodies are classified as 'good' or 'poor' status for quantitative and chemical status, and overall good status requires that both the quantitative and chemical status are good.

The WFD Regulations set a requirement to meet 'Good Status' in all water bodies by 2015, with the exception of water bodies where this was not achievable for reasons of technical feasibility or disproportionate costs. The second cycle RBMPs aimed to prevent the deterioration of water bodies and to protect, enhance and restore them, with the aim of achieving at least 'Good' status (or 'Good Ecological Potential') in 70% of surface water bodies by 2021.

The third cycle RBMP for Northern Ireland 2021-2027 will identify those water bodies which can be classified as being at 'good or better' status and set objectives and a programme of measures for the next six year cycle to help improve those water bodies which are classified as below 'good' status. This is currently at a draft stage, and an updated classification for water bodies for 2021 will be published in the final RBMP. In the interim period, WFD water body classifications were updated mid-cycle (2018) for rivers, transitional and coastal water bodies, while classifications for lakes and groundwater bodies were updated in 2020. **Figure 3.7** illustrates the current (2018) status of WFD surface water bodies (i.e. river, lake, transitional and coastal water bodies), and **Figure 3.8** the current (2020) status of groundwater bodies within Northern Ireland.

Table 3-9 compares the number and percentage of waterbodies within the North Eastern, Neagh Bann and North Western RBDs at 'good or better' status in 2015 and 2018 (2020 for lakes and groundwater bodies). This indicates the following:

- River status - In 2018, 31.3% of Northern Ireland's river water bodies were classified as 'good or better' status, compared to 32.7% in 2015 (based on 450 river water bodies);
- Marine status – In 2018, 40% (10 out of 25) of transitional and coastal water bodies in Northern Ireland were classified at 'good or better' status, compared to 36% (9 water bodies) in 2015;
- Lake status - The assessment of lake water quality in Northern Ireland is based on 21 lakes with a surface area of >50ha. In 2020, 4.8% (1 lake) was classified as 'Good or better' status, compared to 23.8% (5 lakes) in 2015; and
- Groundwater status- In 2020, 84% of groundwater bodies were classified as at overall good status, compared to 65.3% in 2015.

The results of the draft third cycle RBMP classification mean that Northern Ireland will not achieve the objective to have 70% of its water bodies at 'good or better' status. Little improvement has occurred since 2015; at that time 37% of all water bodies were at 'good or better' status, compared to 38% in the latest assessment considering 2018 and 2020 classification updates.

Figure 3.7: WFD Surface Water Ecological Status 2018

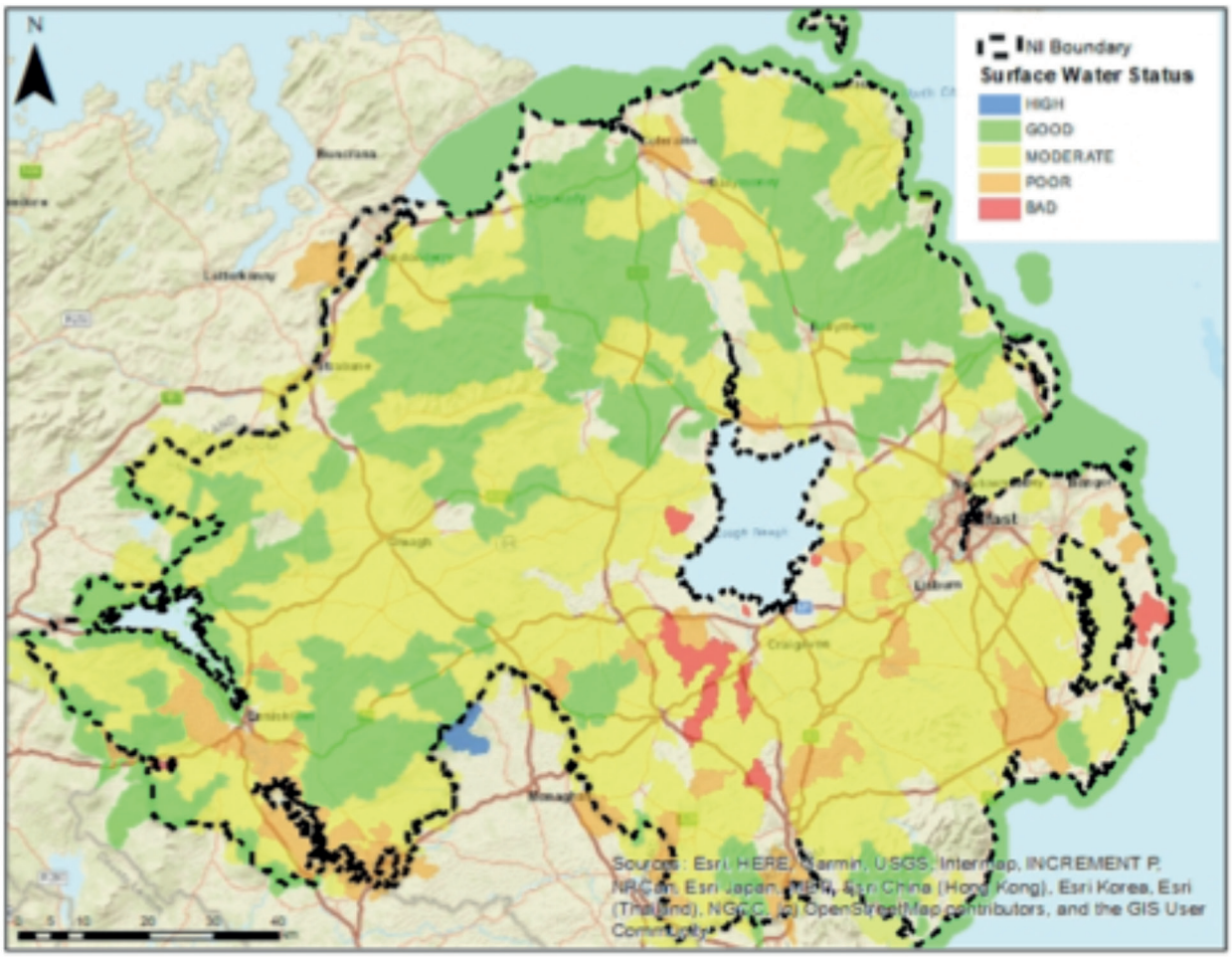


Figure 3.8: WFD status of groundwater bodies in Northern Ireland 2015

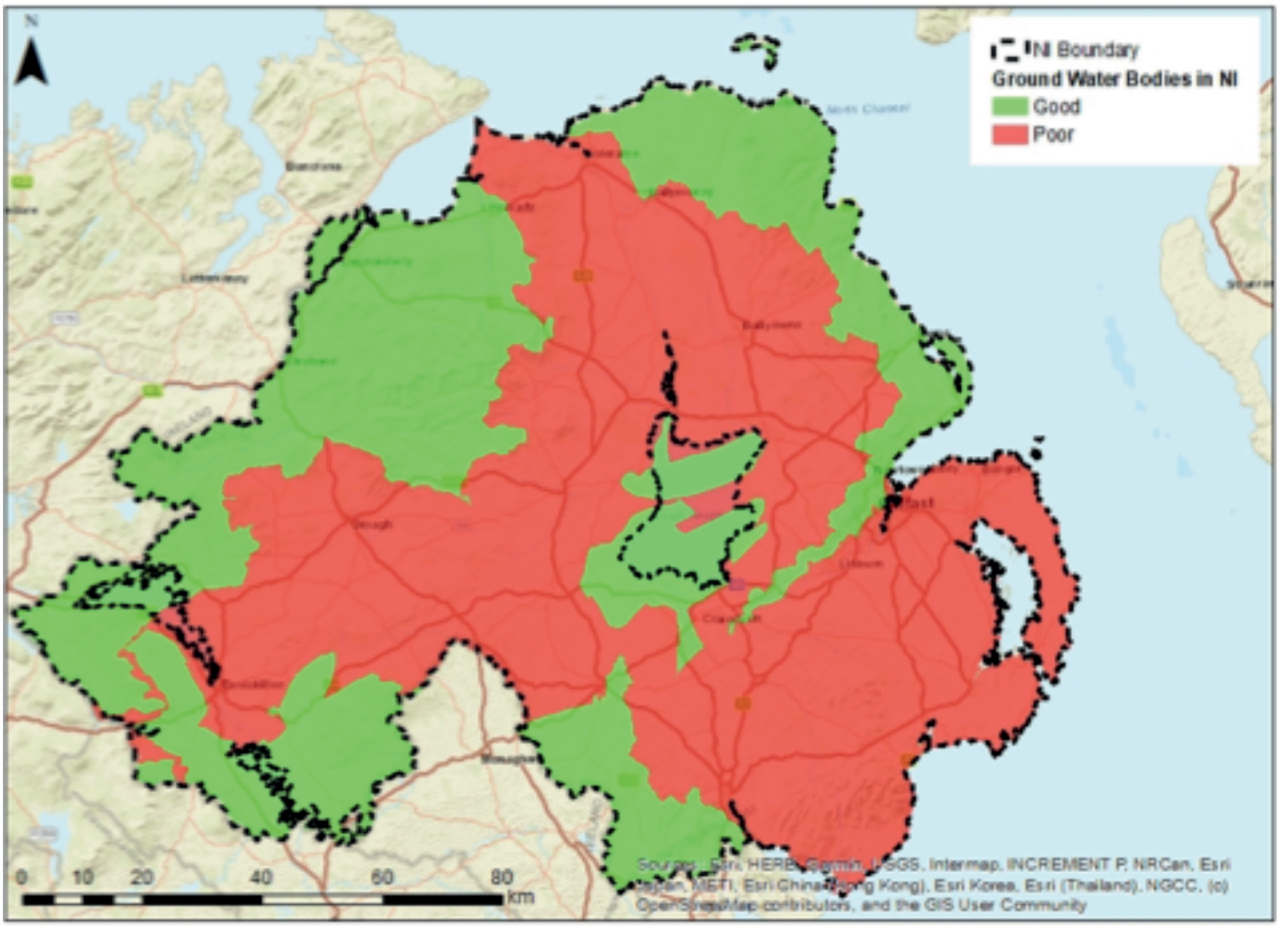


Table 3-9: Comparison of WFD Water Bodies at 'Good or Better' Status for 2015 and 2018

	No. in NW IRBD	No. in NB IRBD	No. in NE RBD	Northern Ireland	
				No.	%
Rivers 2015	75	54	18	147	33
Rivers 2018	68	56	17	141	31
Transitional & coastal 2015	1	1	7	9	36
Transitional & coastal 2018	1	2	7	10	40
Lakes 2015	2	2	1	5	24
Lakes 2020	1	0	0	1	5
Groundwater 2015	37	6	6	49	65
Groundwater 2020	41	12	10	63	84
All water bodies 2015	115	63	32	210	37
All water bodies 2018/2020	111	70	34	215	38

3.2.4.2 Water Framework Directive Register of Protected Areas in Northern Ireland

The WFD Regulations required the establishment of a register of protected areas for Northern Ireland, for water bodies or parts thereof that require additional water quality protection owing to their importance to people or wildlife. This is outlined in Article 10 of the WFD Regulations.

The register comprises the following protected areas:

a) A drinking water protected area;

b) An area or body of water requiring special protection in accordance with any EU instrument protecting surface water, groundwater or conservation of habitats and species, including:

(i) Areas designated for the protection of economically significant aquatic species (including shellfish water protected areas);

(ii) Bodies of water designated as recreational waters;

(iii) Nutrient-sensitive areas; and

(iv) Areas designated for the protection of habitats or species where the maintenance or improvement of the status of water is an important factor in their protection.

The WFD protected areas in Northern Ireland are summarised in **Table 3-10**.

Table 3-10: WFD Register of Protected Areas

WFD Protected Area Type		North Eastern RBD	North Western IRBD	Neagh Bann IRBD	Total Number
Drinking Water Protected Areas	Surface water	8	10	8	26
	Groundwater	10	42	13	65
Shellfish Water Protected Areas		7	2	1	10
Bathing Waters		22	3	1	26
Urban Waste Water Sensitive Areas		16	4	3	23
Water Dependent Protected Areas		25	27	24	66*
Groundwater-dependent terrestrial ecosystems		2	5	2	9

*Note: some protected sites straddle more than one RBD, hence the NI total does not equal the sum of the RBDs.

Drinking water protected areas are waters used for the abstraction of drinking water, including surface waters and groundwaters; within the three RBDs of Northern Ireland, there are a total of 26 surface waters and 65 groundwaters included as WFD Protected Areas. Economically significant aquatic species protected areas are designed to protect aquatic species that are of economic importance, including designated shellfish waters; within the three RBDs of Northern Ireland, there

are 10 sites designated as WFD Protected Areas for shellfish. Bathing water protected areas are those identified under the Bathing Waters Directive (2006/7/EC); within the three RBDs of Northern Ireland, there are a total of 26 bathing waters included as WFD Protected Areas. Nutrient sensitive areas in Northern Ireland are those designated as sensitive under the Urban Waste Water Treatment Directive (UWWTD) (91/271/EEC) and the Nitrates Directive (91/676/EEC); within the three RBDs of Northern Ireland, there are a total of 23 Urban Waste Water Treatment Directive sensitive areas. These are areas where more stringent treatment is required to prevent surface water becoming eutrophic, to prevent exceedance of the nitrates drinking water standard, and to meet the requirements of other Regulations, such as those for bathing waters. No individual areas have been designated as nutrient sensitive WFD Protected Areas under the Nitrates Directive, rather a total territory approach has been adopted for Northern Ireland.

Water-dependent protected areas in Northern Ireland are designated for the protection of habitats or species, where the maintenance or improvement of the status of water is an important factor in their protection. Northern Ireland has a total of 66 water-dependent UK national network sites (formerly Natura 2000 sites), which are designated under the Conservation (Natural Habitats, etc.) (Amendment) Regulations (Northern Ireland). Further information regarding the status of water-dependent protected areas is provided in Section 3.2.1 Biodiversity, Flora and Fauna. There are also 9 groundwater-dependent terrestrial ecosystems (GWDTEs) in Northern Ireland. Under the WFD these are assessed as part of the groundwater chemical and quantitative status. In the draft third cycle RBMP 2021-2027, all 9 sites have been classified as at 'good status' in terms of the impact of groundwater quality or quantity on their conditions.

3.2.4.3 Marine Strategy in Northern Ireland

The European Marine Strategy Framework Directive (MSFD) (2008/56/EC), implemented in Northern Ireland through the Marine Strategy Regulations 2010, requires action to be taken to achieve or maintain Good Environmental Status (GES) in marine waters within the marine strategy area by 2020. GES is defined in the Regulations as "the environmental status of marine waters where these provide ecologically diverse and dynamic oceans and seas which are clean, healthy and productive within their intrinsic conditions, and the use of the marine environment is at a level that is sustainable, thus safeguarding the potential for uses and activities by current and future generations".

The Marine Strategy Regulations required the production of a Marine Strategy for UK waters, coordinated across the four UK Administrations. The Strategy aims to help in the delivery of international obligations and commitments such as those under the UN Convention on the Law of the SEA (UNCLOS), UN Sustainable Development Goal 14, OSPAR Strategy and Convention on Biological Diversity. The Strategy applies an ecosystem –based approach to the management of human activities, and considers the following 11 quality descriptors:

- D1 – Biological diversity (cetaceans, seals, birds, fish, pelagic habitats and benthic habitats);
- D2 – Non-indigenous species;
- D3 – Commercially-exploited fish and shellfish;
- D4 – Food webs (cetaceans seals, birds, fish and pelagic habitats);
- D5 – Eutrophication;
- D6 – Sea-floor integrity (benthic habitats);

- D7 – Hydrographical conditions;
- D8 – Contaminants;
- D9 – Contaminants in fish and other seafood;
- D10 – Marine litter; and
- D11 – Underwater noise.

The UK Marine Strategy comprises three parts, to be updated every six years: assessment, monitoring programmes and a programme of measures. The first assessment of UK seas was published in 2012[28], and set objectives, targets and indicators for achieving GES; this was updated in 2019[29], and the status of descriptors for the UK is summarised in **Table 3-11**.

Table 3-11: Assessment of Environmental Status for the UK Marine Strategy

Descriptor	GES Achieved	Trend	Description
D1 & D4 Cetaceans	Partially	Stable/mixed	Achievement of GES uncertain. Status of coastal bottlenose dolphin & minke whale consistent with GES in the Greater North Sea, but uncertain elsewhere.
D1 & D4 Seals	Partially	Improving	GES achieved for grey seals. Harbour seals have not achieved GES in the Greater North Sea; in the Celtic Sea, significant increase in West Scotland but status uncertain in other areas.
D1 & D4 Birds	No	Declining	GES achieved for non-breeding waterbirds in the Greater North Sea but not the Celtic Sea. Breeding seabirds have not achieved GES.
D1 & D4 Fish	No	Improving	GES not yet achieved in the Greater North Sea or Celtic Seas; demersal fish communities recovering from past over-exploitation.
D1 & D4 Pelagic Habitats	Partially	Stable/mixed	Achievement of GES uncertain; prevailing environmental conditions likely driving changes in plankton communities but influence of human activities not certain.
D1 & D6 Benthic habitats	No	Stable/mixed	GES achievement uncertain for intertidal & soft sediment habitats; for soft sediments, the level of physical damage consistent with GES in waters west of the Celtic Seas but not in the Celtic Seas or the Greater North Sea. GES not achieved for sublittoral rock and biogenic habitats.
D2 Non-indigenous species (NIS)	No	Stable/mixed	GES not achieved, but ability to detect new NNIS has improved.
D3 Commercial fish	No	Improving	GES achieved for some commercially exploited fish. In 2015, 53% of marine fish (quota) stocks fished below maximum sustainable yield (MSY), and has increased significantly since 1990. Most national shellfish stocks have not achieved GES or their status is uncertain.

[28] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69632/pb13860-marine-strategy-part1-20121220.pdf

[29] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/921262/marine-strategy-part1-october19.pdf

Descriptor	GES Achieved	Trend	Description
D4 Food webs	Partially	Improving	Achievement of GES is uncertain, components of the marine food web are changing but it is not clear how they are affecting each other.
D5 Eutrophication	Yes	Stable/mixed	GES largely achieved. A small number of problems remain in coastal and estuarine waters, representing 0.03% of the UK EEZ and 0.41% of estuarine and coastal waters.
D7 Hydrographical conditions	Yes	Stable/mixed	GES continuing to be achieved.
D8 Contaminants	Yes	Improving	GES largely achieved. Highly persistent legacy chemicals cause of new failures, mainly in coastal waters close to polluted sources.
D9 Contaminants in seafood	Yes	Improving	GES achieved, high level of compliance with agreed safety levels.
D10 Marine litter	No	Stable/mixed	Beach litter levels in the Celtic Seas largely stable, while levels in the Greater North Sea have slightly increased.
D11 Underwater noise	Partially	Stable/mixed	Achievement of GES is uncertain but research and monitoring programmes are improving understanding.

The NI State of the Seas Report[30] details Northern Ireland's input to the 2012 UK assessments, and highlights the issues that are specific to Northern Ireland. This includes chapters on marine biodiversity, invasive alien species, fisheries and aquaculture, marine food webs, eutrophication, seabed integrity, hydrographical conditions, contaminants, contaminants in biota, litter, energy and underwater noise, maritime archaeology, bathing water quality, and ports and harbour. The status of these descriptors in Northern Ireland is summarised below:

- **Marine biodiversity** – many of the NI marine species and habitats are considered to be in a good state, however some important marine habitats have been damaged by mobile fishing gear (in Strangford Lough, Rathlin Island and the Skerries). Greater protection will be achieved through the designation of Marine Protected Areas under the Northern Ireland Marine Bill.
- **Invasive alien species** – recognised as second (after habitats destruction) in the threat they pose to biodiversity. Several invasive alien species identified in NI coastal waters, including plants (Japanese wireweed and common cord grass) and animals (leathery sea squirt, slipper limpet, Pacific oyster, Didemnum vexillum, bamboo worm and Japanese skeleton shrimp). Non-commercial boating and commercial shipping are considered to pose a significant risk of introduction and spreading. Aquaculture and boating have historically been associated with spread in NI coastal waters.
- **Fisheries and aquaculture** – Irish Sea cod is suffering reduced reproductive capacity and is being harvested unsustainably; sole is at risk of unsustainable harvesting. There has been a sharp reduction in whiting abundance. In the Irish Sea, haddock spawning biomass and herring biomass has recently increased, and the plaice stock is being harvested sustainably. Angel shark is severely depleted and spurdog is depleted, but lesser spotted dogfish and nursehound are

[30] https://www.daera-ni.gov.uk/publications/state-seas-report

stable or increasing. The common skate is severely depleted, but thornback ray and blonde ray are stable or increasing and cuckoo ray is widespread and abundant. The survival of wild salmon at sea has significantly declined in recent years. The WFD has classified estuarine fish communities of the Foyle/Faughan as 'high', the Bann and Newry as 'good' and the Roe, Lagan and Connswater as 'moderate' status. The Dublin Bay prawn stock in the western Irish Sea is being harvested sustainably. The main aquaculture shellfish species in Northern Ireland are blue mussels, pacific oysters, and king scallops.

- **Marine food webs** – The MSFD descriptor concerns the flow of energy and matter between plants and animals and the interactions between species. Abundance of key species in the Irish Sea is closely linked to the seasonal cycle of water movement and the plankton production season. Integration of monitoring programmes and further modelling studies, as well as an awareness of the role played by zooplankton, are needed to gain further information on the status of food webs in Northern Ireland.
- **Eutrophication** – The trophic status of inshore and coastal waters has been monitored over the last 20 years by NIEA and AFBI. Inputs of nitrogen and phosphorus from human sources has generally declined over the last 10 years, however there is evidence of eutrophication in small areas that have restricted water movement, in the brackish and estuarine waters of inner Belfast Lough, tidal Lagan Estuary, north end of Strangford Lough and the Quoile Pondage. Long-term monitoring of Irish Sea open marine waters by AFBI show that they are not eutrophic.
- **Seabed integrity** – The seabed around Northern Ireland has approximately equal areas of mixed coarse sediment, sand and mud. Mixed coarse areas are not subject to the same pressures as other areas and integrity is relatively high. Sandy areas are under more pressure; these may be in poorer condition but generally have high recovery rates. The most significant pressure on seabed integrity is fishing activity; this is concentrated on muddy seabeds for Dublin Bay prawn, and integrity is likely to be lower than in coarser substrata. Some aspects of seabed integrity in the sea loughs are low. Further information and assessment is considered necessary for more accurate assessment.
- **Hydrographical conditions** – Coastal defence structures have altered a substantial proportion of the Northern Ireland coastline, estimated at 100 km. This is particularly the case on soft coastlines. An accurate baseline of coastal defences is necessary, and a strategic approach to shoreline management, taking into account appropriate responses to climate change.
- **Contaminants** – Key sites show significant reductions in heavy metal contamination in sediments; less information is available for newer contaminants that can accumulate in sediments. Effects from tributyl tin (TBT) pollution has significantly declined. Inputs and concentrations of contaminants in seawater have decreased in recent years through control of their use, and are generally below UK EQS limits.
- **Contaminants in biota** – Shellfish flesh is monitored to protect human health; biotoxin levels in shellfish infrequently exceed thresholds for safe consumption, and closure of shellfish areas for this reason are uncommon. Abundance of phytoplankon species that produce biotoxins is low in NI coastal waters, and does not appear to be increasing. Blue mussel in Belfast Lough (Victoria Channel) show a decline in the level of industrial discharges of heavy metals.
- **Litter**- Marine litter is present in significant quantities and does not appear to be reducing, the main forms being plastics and packaging. It is considered that this issue can only be effectively dealt with at source.
- **Underwater noise** – Underwater noise is important for communication by marine mammals and fish. Insufficient data exists for a quantitative assessment of underwater noise in Northern

Ireland or the UK, and more information is needed to better understand impacts of noise on these biota.

3.2.4.4 Flood Risk in Northern Ireland

In recent years, flooding in Northern Ireland has significantly affected communities, businesses, infrastructure and the environment. These effects are expected to increase with the changing climate, with increased seasonal and peak rainfall, rising sea levels and more extreme weather events leading to more frequent and severe flooding.

The Floods Directive (2007/60/EC), implemented in Northern Ireland through 'The Water Environment (Floods Directive) Regulations (Northern Ireland) 2009' and amendments, the "Floods Directive Regulations" requires the establishment of a framework for the assessment and management of flood risks, with the aim of reducing the adverse consequences of flooding on human health, the environment, cultural heritage and economic activity. This works on a six-year cycle of flood risk assessment, prioritisation, updated flood mapping and planning for flooding. As part of the second cycle of flood risk management planning, the NIFRA 2018[31] reviewed the situation regarding flood risk within Northern Ireland. It identified that the main sources of flooding within Northern Ireland are rivers (fluvial flooding), the sea (coastal flooding), and overland surface water flows (pluvial flooding). In total, the NIFRA 2018 identified that approximately 45,000 properties, comprising 5% of the total in Northern Ireland, are at risk from flooding from these sources. Owing to the large number of rivers within Northern Ireland, there is a significant degree of fluvial flood risk, particularly in relation to large rivers. Fluvial flooding occurs when the channel capacity of rivers is exceeded, and water overtops the river banks and flows across the natural floodplain of the river. The impact of fluvial flooding is significantly greater within urban and suburban areas, in part due to the density of receptors and the impact of landuse upon drainage patterns. Significant risk of surface water (pluvial) and coastal flooding also exists throughout Northern Ireland. Significant coastal flooding is relatively rare in Northern Ireland, but can potentially cause major damage in low lying areas, with effects of saltwater inundation causing long term economic and environmental damage. Pluvial flooding results from rainfall that has not reached, or has overwhelmed, man-made drainage systems, and leads to overland flows and ponding within low-lying areas. It can be exacerbated by the extensive areas of hard, impermeable surfaces that are frequently present within urban areas.

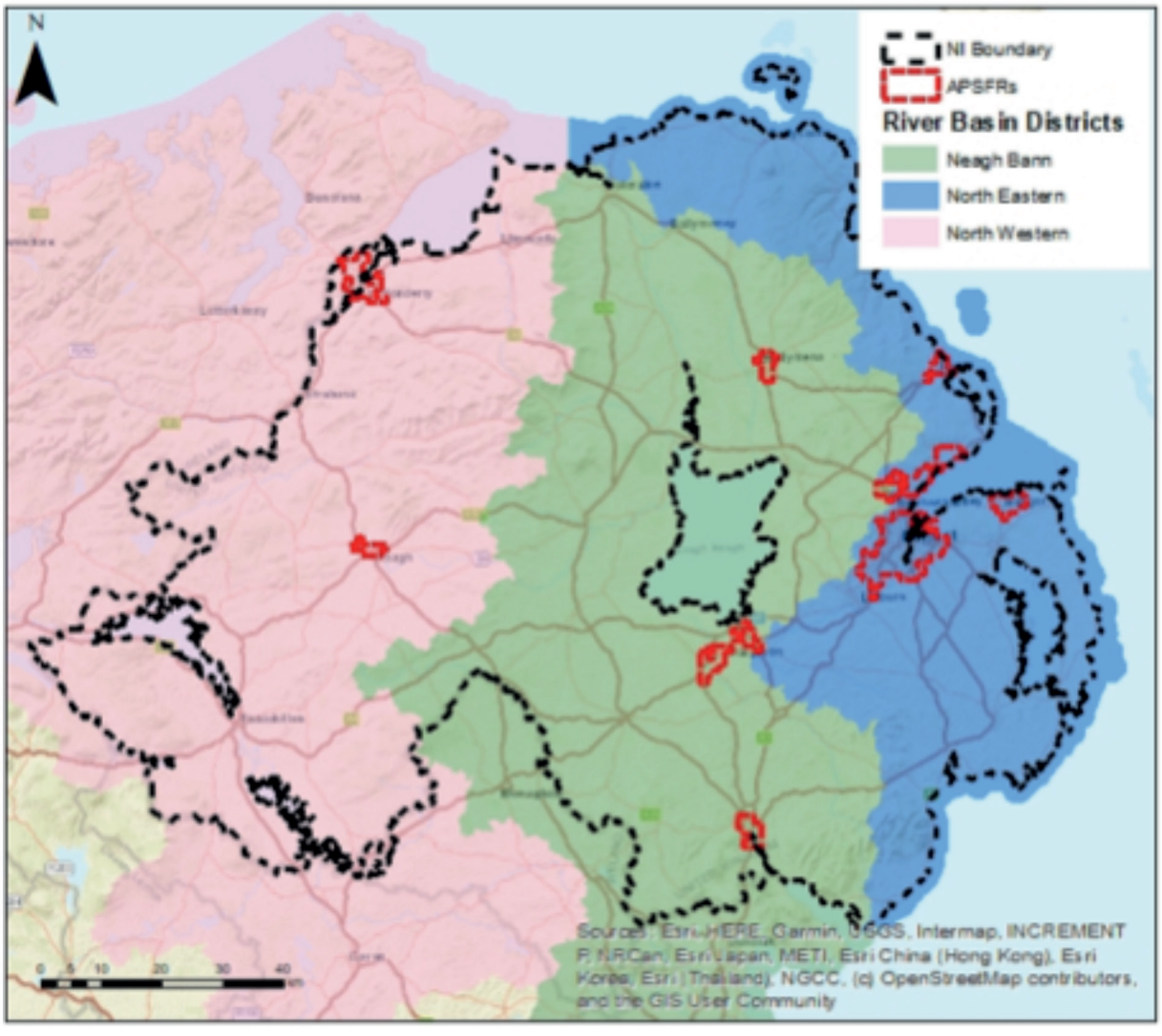
The NIFRA 2018 identified twelve Areas of Potential Significant Flood Risk (APSFR). The names of these areas, along with the RBD in which they are located are listed in **Table 3-12**, and they are shown in **Figure 3.9**. The NI FRMP 2021-2027 is the second cycle Plan for Northern Ireland. It focuses on planning for measures to manage flood risk in these twelve APSFRs.

[31] https://www.infrastructure-ni.gov.uk/sites/default/files/publications/infrastructure/northern-ireland-flood-risk-assessment-report-2018-updated-may2019.pdf

Table 3-12: Areas of Potential Significant Flood Risk in Northern Ireland

APSFR Name	River Basin District
Belfast	North Eastern RBD
Londonderry	North Western IRBD
Newry	Neagh Bann IRBD
Lurgan	Neagh Bann IRBD
Glengormley and Mallusk	Neagh Bann IRBD
Larne	North Eastern RBD
Bangor	North Eastern RBD
Portadown and Craigavon	Neagh Bann IRBD
Omagh	North Western IRBD
Newtownabbey	North Eastern RBD
Carrickfergus	North Eastern RBD
Ballymena	Neagh Bann IRBD

Figure 3.9: Location of Areas of Potential Significant Flood Risk in Northern Ireland



3.2.4.5 Summary of Existing Pressures and Issues for Water in Northern Ireland

The most recent State of the environment report for Northern Ireland states that industry, power generation, agriculture and forestry, development, transport and infrastructure pressures all potentially impact on Northern Ireland's water environment[32]. Under the WFD, pressures on the quality of the water environment have been assessed according to two types, as follows:

- Point source pollution pressures on water quality – e.g. effluent discharges arising from industry and WWTWs; sewer overflows during heavy rainfall events; and
- Diffuse source pollution pressures on water quality – e.g. contaminated surface run-off from roads, construction sites, fuel storage areas; septic tank discharges; acid and nutrient deposition from the air; run-off of pesticides, soils and nutrients from agriculture and forestry, and migration of these to groundwaters and surface waters.

Abstractions and impoundments of water for drinking water supply, industry, agriculture, recreation, and hydropower can lead to pressures on water quantity and flow, and can exacerbate existing water quality issues. The introduction and spread of invasive non-native species, including aquatic plants such as Floating Pennywort and Curly Waterweed, can impact upon native aquatic biodiversity, and can adversely affect water-based recreational activities. The risk of flooding following heavy rainfall events can be increased by land management practices that influence water storage potential and run-off, such as in urban areas where impermeable surfaces are common.

Implementation of the NI FRMP has the potential to lead to positive and negative effects on the quality of water bodies in Northern Ireland alone, or in combination with, these existing pressures. There is potential for short-term negative effects from construction of flood management infrastructure such as sedimentation, contamination or more long-term effects such as the spread of invasive species, or effects on waterbody hydromorphology. However flood management infrastructure may also positively affect water quality of associated waterbodies, through the improvement of flooding related impacts.

3.2.5 Climatic Factors

Climate change represents one of the most important threats to our environment, and to our economy, and projections indicate that hotter, drier summers and warmer wetter winters will occur over the next century as a result of climate change.

According to the United Nations Intergovernmental Panel on Climate Change (2018)[33] :

"Human activities are estimated to have caused approximately 1.0 °C of global warming above pre-industrial levels, with a likely range of 0.8 °C to 1.2 °C. Global warming is likely to reach 1.5 °C between 2030 and 2052 if it continues to increase at the current rate".

[32] https://www.daera-ni.gov.uk/sites/default/files/publications/doe/corporate-report-from-evidence-to-opportunity-second-assessment-of-state-of-ni-environment-2013.pdf

[33] https://www.ipcc.ch/sr15/chapter/spm/

It is considered that the key issues associated with implementation of the NI FRMP and climatic factors comprise:

- Increased flood risk associated with climatic change;
- Contribution of flood management infrastructure development to emissions; and
- Adaptability of flood management infrastructure to climate change exacerbated flood risk.

3.2.5.1 Climate of Northern Ireland

The climate of Northern Ireland is characterised by equability, a consequence of the moderating effects of the Atlantic Ocean - bringing relatively mild winters and cool summers. However, the indented shape of the coastline and the presence of high ground introduce localised differences in temperature, cloud and precipitation. The mean annual temperature at low altitudes in Northern Ireland varies from about 8.5 °C to 10.0 °C, with the higher values occurring around or near to the coasts. Rainfall in Northern Ireland varies widely, with the wettest places being in the Sperrin, Antrim and Mourne Mountains. The highest areas have average annual totals of about 1,600mm. The wettest places are in the upland areas around Killeter Forest in the extreme west of County Tyrone, where the annual average reaches about 2,000mm. The driest places are further east - around Strangford Lough and close to the east coast, and near to the southern and eastern shores of Lough Neagh - where the annual totals are less than 800mm[34].

3.2.5.2 Climate change and flood risk in Northern Ireland

Climate change projections for the UK, as published in 2018 (UKCP18)[35] , set out a range of possible scenarios for the next century, on the basis of differing rates of greenhouse gas (GHG) emissions into the atmosphere. As a result of the changing climate, it is anticipated that both the amounts and intensity of rainfall will increase within Northern Ireland, with a trend towards stormier, more extreme weather conditions. There will be a greater chance of hotter, drier summers and warmer, wetter winters. The highest predicted releases for Northern Ireland indicate that, by 2070, winters could be up to 3.9°C warmer and 25% wetter, while summers could be up to 4.9°C hotter and 38% drier. Coastal areas are likely to be affected by a rise in sea levels, with the highest projections for Northern Ireland indicating that sea levels in Belfast could rise by up to 94cm by 2100. These changing conditions are anticipated to increase flood risk in Northern Ireland; those communities currently at risk could experience an increase in the severity or frequency of flooding, while communities not currently at risk may become affected[36]. Increasing flood risk is also likely to put pressure on sewage, roads, water and habitats.

The Floods Directive Regulations made it a legal requirement for climate change to be considered in the assessment of flood risk, in order to highlight those areas most susceptible to increased flood risk arising from climatic changes and enable them to be fully considered when setting objectives and measures for the management of flood risk. The NIFRA 2018 included a climate change analysis in assessing the impacts of climate change on flood risk of "at risk" receptors, considering the medium probability scenarios for Northern Ireland for the 2080s epoch. This analysis indicated

[34] https://www.metoffice.gov.uk/climate/uk/regional-climates/ni#rainfall.
[35] https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/index
[36] https://www.infrastructure-ni.gov.uk/publications/northern-ireland-flood-risk-assessment-nifra-2018

an increase of over 8,500 residential and 2,200 non-residential properties at risk from combined sources of flooding (many of these may be prone to flooding from more than a single source). The North Eastern RBD was predicted to be impacted by climate change the most, followed by the Neagh Bann IRBD. Impacts of coastal climate change were least significant within the Neagh Bann IRBD, likely a result of the shorter length of coastline here in comparison to the other RBDs. The analysis indicated that the majority of climate change impacts were on residential properties, most likely because these account for over 90% of properties in Northern Ireland. Key infrastructure was most affected by pluvial flooding, with an additional 150 assets at risk, followed by fluvial (69 additional assets) and coastal (29 assets). IPPC sites were also most affected by pluvial flooding (5 additional assets), followed by fluvial (3 additional assets) and coastal (1 additional asset).

The NI FRMP 2021-2027 aims to protect communities from the risks and impacts of flooding. An integral part of the flood risk management planning and adaptation measures in the NI FRMP is to take into account the likely effects of climate change in order to address the increased future risks. Indeed, one of the ten Plan objectives is "To consider and prepare for the impacts of Climate Change for the main sources of flooding". The "Technical Flood Risk Guidance in Relation to Allowances for Climate Change in Northern Ireland" was published by DfI in 2019, consolidating and updating existing guidance on allowances for climate change. It will also act as a guide for those involved in managing flood risk in relation to development planning and management. Climate change flood hazard maps have been produced by DfI (currently based on UKCP09 data), available through Flood Maps (NI) and can be used by planning authorities, in addition to advice from DfI in the assessment of development planning within these areas.

3.2.5.3 Summary of Existing Pressures and Issues for Climatic Factors in Northern Ireland

Since the start of the 20th century records show that the climate in NI is changing, and climate change is recognised as one of the main threats in Northern Ireland's most recent state of the environment review (2013). The Paris agreement, signed in 2015, committed to strengthening the global response to the threats of climate change, by holding the global temperature rise to no more than 2°C and preferably below 1.5°C. Key to this agreement is the reduction of GHG emissions fast enough to achieve this temperature goal. The UK Climate Change Act 2008 introduced a legally binding target for the reduction of GHG emissions in the UK by at least 80% below 1990 baseline levels by 2050. The target for the current 2018-2022 period is a reduction in emissions by 37% by 2020 and, for the next period (2025) to reduce emissions by 51%. The Act was amended in 2019, and now commits the UK to reducing emissions by 100% by 2050 from 1990 baseline levels (in line with the 'net zero 2050 target' set or the EU in the recent European Green Deal 2019).

In 2017, Northern Ireland's GHG were estimated to be 20.0 MtCO2e, a reduction of 17.9% since 1990. Agriculture, transport and energy supply were the largest contributing sectors to greenhouse gas emissions in Northern Ireland in 2017. In 2017, NI's total greenhouse gas emissions accounted for 4% of the UK total, higher than its population share of 3%.

Activities associated with the development of flood management infrastructure, including manufacturing, transportation, construction and maintenance, may lead to increased emission of pollutants into the atmosphere, thus contributing towards anthropogenic climate change. However, the NI FRMP aims to manage the flood risk in Northern Ireland arising from the sea, rivers and

surface waters and, as such, has the potential to provide long term protection from climate change-related flood risk within Northern Ireland.

3.2.6 Material Assets

The term 'Material Assets' can be considered very broadly within the SEA process encompassing, for example, infrastructure, settlements, transport and utilities.

It is considered that the key issues associated with implementation of the NI FRMP and material assets comprise:

- Protection of assets at risk of flooding; and
- Potential for short-term disruption to material assets during construction of schemes arising from the NI FRMP.

3.2.6.1 Key infrastructure in Northern Ireland

3.2.6.1.1 Utilities

There were 24 water treatment works in service with NI Water in 2020, serving 51 water supply zones (designated areas with a population of no more than 100,000). Water supplies in Northern Ireland were obtained from three types of source[37]:

- Rivers and loughs - 54.4%;
- Impounding reservoirs - 45.5%; and
- Boreholes – 0.1%

Microbiological, physical and chemical tests on water samples taken from water treatment works, service reservoirs and customer taps indicated that the overall drinking water compliance of public water supplies in 2020 was consistently high at 99.94%[38].

Since 2007, waste water treatment works (WwTWs) must be compliant with numeric conditions of Water Order consents, and NI Water has been responsible for regulating discharges from WwTWs under the Water (Northern Ireland) Order 1999. Water Order permissions or 'consents' specify the quality and quantity for discharges into the water environment, taking into account the requirements of EU Directives and implementing national legislation. NI Water assess compliance against these standards for discharges that serve a population equivalent (PE) of greater than 249. The number of WwTWs assessed in Northern Ireland was 233 in 2019, a decrease of 11 since 2017; of these 221 (95%) were found to be compliant with the conditions of Water Order consents. There are also six WwTWs that operate under a Public Private Partnership (PPP); each of these continued to achieve 100% compliance with conditions of their Water Order consents.

[37] https://www.niwater.com/sitefiles/resources/pdf/water-quality/2020/2020niwaterdrinkingwaterqualityannualreport.pdf

[38] https://www.daera-ni.gov.uk/sites/default/files/publications/doe/corporate-report-from-evidence-to-opportunity-second-assessment-of-state-of-ni-environment-2013.pdf

The Urban Waste Water Treatment Directive (UWWTD) protects the environment from the adverse effects of sewage discharges, setting treatment levels on the basis of the size of sewage discharges and the sensitivity of waters receiving the discharges. There were 78 WwTWs in Northern Ireland assessed for compliance with the implementing national legislation, the Urban Waste Water Treatment (UWWT) Regulations (Northern Ireland) 2007, in 2019. The level of compliance has improved since 2007, with one WwTW non-compliant in 2019, a compliance rate of 99%.

Population growth and development are placing increased pressure on water treatment and supply and wastewater treatment, particularly in urban areas. There are currently c. 863,000 domestic, agricultural, commercial and business properties connected to the public water supply in Northern Ireland (around 99.9% of the total population). NI Water, the utility provider for Northern Ireland supplies 562 million litres of water daily and treats 134 million m3 of wastewater annually . Annual population growth has been positive for the past 25 years in Northern Ireland, and the total population is predicted to increase from approximately 1.89 million in 2019 to approximately 1.99 million by 2043. There is a growing demand for water resources, owing to a lower average house occupancy, increased use of appliances, economic development and changing land uses. This is likely to put increasing pressure on the provision of water and wastewater treatment services.

Northern Ireland has 8,427 electricity substations, and four existing gas transmission lines, namely the South-North gas transmission pipeline, the North-West gas transmission pipeline, the Scotland to Northern Ireland Pipeline (SNIP) and the Belfast Gas Transmission Line (BGTL).

3.2.6.1.2 Roads, Rail and Air travel infrastructure

The road networks in Northern Ireland intersect both urban and rural areas in the form of motorways, A roads, B roads and local roads; together these comprise approximately 25,000 km of public road. In association with this road network, there are approximately 9,000 km of footways, 5,800 bridges and 261,000 streetlights. There are six designated railway routes in Northern Ireland, covering a total distance of 329,855 km; with the exception of the Portrush to Coleraine line, these routes all serve the city of Belfast at some point.

There are three main commercial airports in Northern Ireland: Belfast International Airport, City of Derry Airport and George Best Belfast City Airport. There are also 23 smaller airfields in Northern Ireland, used for commercial, private or military purposes.

3.2.6.2 Summary of Existing Pressures and Issues for Material Assets in Northern Ireland

The growing population of Northern Ireland is putting increasing pressure on utilities and the provision of services such as a clean water supply, treatment of waste, transport and energy use. Implementation of the NI FRMP has some potential for negative effects on existing infrastructure, through disturbance or disruption of supply during construction of flood management infrastructure however, on the whole, the NI FRMP, and measures therein, is anticipated to positively affect existing material assets through the protection of these assets against flood risk.

3.2.7 Cultural, Architectural and Archaeological Heritage

Northern Ireland is rich in cultural, archaeological and architectural heritage, with many important archaeological sites, monuments and heritage buildings. It is considered that the key issues associated with implementation of the NI FRMP and cultural, architectural and archaeological heritage comprise:

- Potential for direct or indirect impacts on known archaeological and architectural features and their settings from implementation of flood protection schemes within the NI FRMP;
- Potential for direct or indirect impacts on archaeological features discovered during construction of water management infrastructure; and
- Protection of assets at risk of flooding.

3.2.7.1 Designated Heritage Features

There are over 16,500 features within Northern Ireland that are registered on the Northern Ireland Sites and Monuments Record (NISMR). This includes over 1,980 Scheduled Zones, i.e. zones scheduled for protection under Article 3 of the Historic Monuments and Archaeological Objects (Northern Ireland) Order 1995. A Scheduled Monument Consent is required for any works within Scheduled Areas. In addition, there are 9,636 industrial heritage sites and 738 defence heritage sites in Northern Ireland that are not included on the NISMR. The Northern Ireland Buildings Database contains records of buildings judged to be of architectural or historic merit; there are over 10,229 Listed buildings, within Northern Ireland, including houses, churches, bridges and canal structures. Listed Buildings are those designated through listing as being of 'special architectural or historic interest' under Section 80 of the Planning Act (NI) 2011. In Northern Ireland territorial waters there are approximately 340 known historic wrecks and approximately 2,700 recorded marine losses. Further to this there is the potential for previously unknown archaeological material of importance to be discovered during the course of construction activities on or below the seabed, particularly during excavation and/or dredging.

Areas of Significant Archaeological Interest (ASAI) are non-statutory designations that seek to identify distinctive areas of the historic landscape in Northern Ireland. There are 10 ASAIs in Northern Ireland, including Devenish in Fermanagh and Dunluce in Coleraine.

Areas of Archaeological Potential (AAPs) are areas within the historic cores of towns and villages, where, on the basis of current knowledge, it is likely that archaeological remains will be encountered in the course of continuing development and change. There are 117 AAPs within Northern Ireland.

A Register of Parks, Gardens and Demesnes of Special Historic Interest was established in the late 1990s to identify those sites that can be considered of exceptional importance within Northern Ireland; there are 242 of these sites.

There is one UNESCO world heritage site in Northern Ireland; being the Giant's Causeway, designated for its unique geological heritage.

3.2.7.2 Summary of Existing Pressures and Issues for Cultural Heritage in Northern Ireland

Built heritage in Northern Ireland has been adversely affected by population growth and expansion of the agricultural sector since the 18th century, with major landscape changes such as marginal land reclamation and removal of peatland occurring since the UK joined the EU in the 1970s[39] . According to the most recent State of the Environment report for Northern Ireland (2013), the archaeological resource is at risk from agricultural land use practices such as ploughing and tree planting, and from urban development.

At present, 527 heritage assets, including 5.4% of listed buildings, are on the Heritage at Risk register, while 3% of Scheduled Historic Monuments are considered to be in poor condition[40]. Environmental protection policies since the 1980s have brought protection to known archaeological sites and have incentivised good management practices, however protected and unprotected sites are considered to remain at risk from arable practices and urban development.

Implementation of the NI FRMP, and measures therein, has the potential to lead to positive or negative effects on the condition or setting of heritage assets alone, or in combination with, these existing pressures. There is potential for direct or indirect effects on archaeological and architectural features within, or in close proximity to, waterbodies within APSFR, from the application of measures outlined in the NI FRMP.

3.2.8 Landscape and Visual Amenity

'Landscape' is defined by the European Landscape Convention as "an area as perceived by people whose character is the result of the action and interaction of natural and/or human factors' and 'it concerns landscapes that might be considered outstanding as well as everyday or degraded landscapes'. It aims to promote landscape protection, management and planning, and to organise European co-operation on landscape issues. The UK ratified the Convention in 2006, and it came into effect in 2007. Signatories to the Convention are required to draw up specific and/or sectoral landscape strategies, linked by landscape quality objectives.

Northern Ireland comprises a wide variety of different landscapes, including river valleys, drumlin hills, lakelands, raised bogs and rolling farmlands, to name a few. Many of these are recognised as being distinctive owing to their intrinsic character and natural or man-made beauty. The current landscape of Northern Ireland is a product of land use changes and human interventions that have taken place in the c.9,000 years since the area was first settled. Although population growth in the late 20th and early 21st centuries expanded the extent of built up areas, the Northern Ireland landscape remains predominantly rural, with agriculture the most prevailing land use[41].

[39] https://www.daera-ni.gov.uk/sites/default/files/publications/doe/corporate-report-from-evidence-to-opportunity-second-assessment-of-state-of-ni-environment-2013.pdf

[40] https://www.communities-ni.gov.uk/sites/default/files/publications/communities/ni-heritage-statistics-310319.pdf

[41] https://www.daera-ni.gov.uk/sites/default/files/publications/doe/corporate-report-from-evidence-to-opportunity-second-assessment-of-state-of-ni-environment-2013.pdf

It is considered that the key issues associated with implementation of the NI FRMP and landscape and visual amenity comprise:

- Effects on areas of designated landscape quality and scenic views such as Area of Outstanding Natural Beauty, National Parks, and Areas of High Scenic Value (i.e. in Local Development Plans); and
- Effects on landscape and seascape character.

3.2.8.1 Designated Landscapes

The value of the landscape present in Northern Ireland is recognised through the designation of eight Areas of Outstanding Natural Beauty (AONB), designated for their distinctive landscape character and high scenic value. These areas cover approximately 325,000 hectares, or c.20% of the total land area of Northern Ireland, and include Strangford Lough, the Antrim Coast and Glens, the Causeway Coast and Ring of Gullion. The Giant's Causeway and Causeway Coast is also a World Heritage Site. There are also eight NIEA Country Parks, and 56 National Trust Sites within Northern Ireland.

3.2.8.2 Landscape Character Assessment

Landscape Character Assessment is a tool for identifying the features that are particular to a locality and that can be used to categorize the landscape into areas of similar character. Landscape Character Assessment has arisen from the European Landscape Convention (ELC), the first international convention to focus on the protection, management and planning of all landscapes in Europe. The Nature Conservation and Amenity Lands Order (NI) 1985 (NALCO) is the current legislative basis for the protection of landscapes. A Landscape Character Assessment for Northern Ireland was undertaken in 2000 (NILCA)[42]; this subdivided the countryside into 130 Landscape Character Areas (LCAs), each based upon local patterns of geology, landform, land use, cultural and ecological features. For each LCA, the key characteristics were described, and an analysis of landscape condition and its sensitivity to change was made. The land use planning system will generally refer to the NILCA where development might affect the landscape character[43]. The NILCA also identified Areas of Scenic Quality; these are often included in development plans as Areas of High Scenic Value (AoHSV) and may be recognised for their natural and cultural heritage value in addition to their scenic value.

The Northern Ireland Regional Landscape Character Assessment (NIRLCA)[44], developed in 2016, aimed to complement the NILCA by providing a regional framework upon which more detailed local studies could be based. This subdivided the countryside into 26 Regional Character Areas (RCAs), based upon information relating to people and place and the combinations of nature, culture and perception that contribute to local uniqueness. These aim to provide information on which to base plans at a more local level that might affect landscape character.

[42] https://www.daera-ni.gov.uk/articles/landscape-character-northern-ireland

[43] kess_es_policybriefing_landscape-planning-for-sustainable-development-.pdf (niassembly.gov.uk)

[44] https://daerani.maps.arcgis.com/apps/MapJournal/index.html?appid=3fdf82b3e41e44a1bb86a542dfb67d97

The Northern Ireland Regional Seascape Character Assessment (NIRSCA)[45], undertaken in 2012, provided a strategic understanding of different areas of regional seascape character along the Northern Ireland coast, recognising 24 different Regional Seascape Character Areas (RSCAs).

Throughout Northern Ireland, there are also a wide variety of Tourism Conservation Zones, Local Landscape Policy Areas and Areas of Village Character.

3.2.8.3 Summary of Existing Pressures and Issues for Landscape and Visual Amenity in Northern Ireland

The main pressures on landscape in Northern Ireland, according to the most recent State of the Environment report (2013), are development (including housing, industrial and recreational), infrastructure, extraction industries, agriculture and forestry, and tourism. Land cover and habitats have changed in the past few decades as a result of population increases, changes in household structure and employment patterns and agricultural restructuring. While the economic recession slowed the rate of developments for a period post-2008, actions to stimulate economic growth have put continued pressure on urban and rural landscapes[46].

Implementation of the NI FRMP, and measures therein, has the potential to lead to positive or negative effects on the local landscape character or visual quality alone, or in combination with, these existing pressures. There is potential for direct or indirect effects on the general landscape, as well as on areas designated for landscape quality and scenic views, from the application of measures outlined in the NI FRMP.

[45] http://www.daera-ni.gov.uk/publications/northern-ireland-regional-seascape-character-assessment

[46] https://www.daera-ni.gov.uk/sites/default/files/publications/doe/corporate-report-from-evidence-to-opportunity-second-assessment-of-state-of-ni-environment-2013.pdf

4 Review of Relevant Plans, Programmes and Policies

4.1 Interaction with other relevant Plans and Programmes

As part of the SEA process, the policy context of the 1st cycle NI FRMP 2015-2021 was established in Chapter 4 of the SEA Environmental Report with regard to other Plans and Programmes that have been adopted at International, European and National levels. In particular the interaction of the environmental protection objectives and standards included within these Plans and Programmes with the NI FRMP required consideration. The SEA Environmental Report for the 1st cycle FRMPs provided an overview of the policy context into which the Plans sit, and included a list of other policies, plans and programmes which have relevance to the Plans (Table 7 of the Environmental Report).

This Section provides a review and update of Plans and Programmes of relevance to the 2nd cycle of the NI FRMP 2021-2027. **Table 4-1** below updates the identified main significant environmental plans, programmes and legislation, adopted at International, European Community or National level, which would be expected to influence, or be influenced by the NI FRMP.

As a result of the UK's exit from the EU, several pieces of legislation have been enacted in Northern Ireland, in order to ensure that existing legislation that refers to driving EU Directives remains operable. The Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 transposed the Habitats Directive and certain elements of the Wild Birds Directive (Directive 2009/147/EC), together termed the "Nature Directives" into Northern Ireland legislation. The Conservation (Natural Habitats, etc.) (Amendment) (Northern Ireland) (EU Exit) Regulations, required to ensure that the 1995 Regulations remained operable following the UK's exit from the EU, created a national site network within the UK, comprising the protected sites already designated under the Nature Directives, and any further sites designated under these Regulations. The requirement for certain plans and programmes to be subject to the HRA process remains an integral part of the Habitats Regulations in Northern Ireland; the 2nd cycle NI FRMP has been subject to HRA, and further HRAs will be undertaken at project level, as the need arises. SAC and SPA sites within the Republic of Ireland remain within the Natura 2000 network of EU sites, with the protection of European sites within the Republic of Ireland underpinned by the European Communities (Birds and Habitats) Regulations 2011 (RoI S.I. No. 477 of 2011). Any projects arising from the NI FRMP with potential for transboundary effects should be cognisant of this.

The 2002 Biodiversity Strategy for Northern Ireland was under review at the time of production of the 1st cycle NI FRMPs. This has now been updated as "Valuing Nature – A Biodiversity Strategy for Northern Ireland to 2020" (DOENI 2015). The NI FRMP 2021-2027 should support the aims and commitments of the Strategy by minimising impacts on biodiversity and seeking opportunities for enhancement.

Also of note is the Regional Development Strategy (RDS) 2035: Building a Better Future, which supersedes the Regional Development Strategy for Northern Ireland 2025 cited in the Environmental Report for the 1st cycle NI FRMPs. The 2035 RDS provides an overarching strategic planning framework for the future development of Northern Ireland to 2035. In addition, the draft Marine Plan for Northern Ireland will inform and guide the regulation, management and protection of the inshore and offshore marine area in Northern Ireland. Projects arising from the 2nd cycle NI FRMP will need to have regard for the policies outlined in these documents and contribute to

environmental protection and sustainable development. At a more local level, Local Development Plans (LDPs) guide the future use of land and are a fundamental tool in the implementation of Government policies and strategic objectives. LDPs for council areas in Northern Ireland are currently under development, with some councils having produced a draft Plan Strategy, and others a Preferred Options paper. In preparation of LDPs, councils should take into account the RDS, the Sustainable Development Strategy for Northern Ireland, and any other relevant policy or guidance. PPS15 influences LDPs by minimising the amount of development land designated in areas of flood risk. Prior to the publishing of LDPs, development outside flood risk areas is reliant on councils and Planning NI applying PPS15.

The Marine Strategy Regulations (2010) transposed the EU Marine Strategy Framework Directive into UK legislation, and require action to be taken to achieve or maintain Good Environmental Status (GES) in UK seas. These Regulations required the production of a Marine Strategy for all UK waters, coordinated across all four UK Administrations. This has been divided into three parts. The first of these outlines the assessment of GES; the initial assessment was published in 2012, with input from information provided by Northern Ireland in the State of the Seas report, and the updated assessment was published in 2019. Part Two of the UK Marine Strategy sets out monitoring programmes, and was last updated in March 2021, while Part Three outlines the programme of measures that contribute to the achievement and maintenance of GES in UK Seas. In coastal waters, many of the descriptors for which GES should be achieved under the UK Marine Strategy overlap with the requirements of The Water Environment (WFD) Regulations (Northern Ireland) 2003, however certain indicators under the Marine Strategy are not captured under the WFD Regulations (e.g. noise which can have an adverse impact on marine mammals, or litter). The NI FRMPs should support the objectives of both the WFD Regulations and the Marine Strategy Regulations.

The Northern Ireland Climate Change Adaptation Programme (NICCAP) has been updated since the 1st cycle NI FRMPs, as required by the Climate Change Act (2008). The NICCAP2 for the period 2019-2024 provides an update on the strategic objectives and policies by which government Departments will meet objectives. The updated Climate Change Risk Assessment 3 (CCRA3) for the UK, including a summary report for Northern Ireland, was published by the UK Committee for Climate Change in June 2021. The report notes that risks in coastal areas emanate from the effects of coastal flooding, sea level rise, and coastal erosion as well as extreme weather events. These risks will impact upon a wide range of aspects of the Northern Irish coastline and, in particular upon infrastructure services, coastal communities, coastal habitats and species as well as cultural and historical sites. The NI FRMP aims to manage flood risk which is a key risk area identified as an outcome of climate change and should be cognisant of the need to understand the risks arising from climate change, plan for them and adapt to them.

Table 4-1: Summary of Updated Key Plans and Programmes Relevant to the 2nd cycle NI FRMP 2021-2027

Level	Plan/Programme/Legislation
International and EU Level	EU Floods Directive [2007/60/EC]
	Habitats Directive [92/43/EEC]
	Birds Directive [2009/147/EC]
	Bonn Convention [L210, 19/07/1982 (1983)]
	Convention for the Protection of the Archaeological Heritage of Europe (Valletta 1992)
	Convention for the Protection of the Architectural Heritage of Europe (Granada 1985)
	Drinking Water Directive [98/83/EC]
	EIA Directive [85/337/EEC] [2014/52/EU]
	Environmental Liability Directive [2004/35/EC]
	Environmental Quality Standards Directive [2008/105/EC]
	EU Biodiversity Strategy to 2020 [COM(2011)244]
	European Landscape Convention [ETS No. 176]
	Groundwater Directive [80/68/EEC] and Daughter Directive [2006/118/EC]
	Marine Strategy Framework Directive [2008/56/EC]
	Maritime Spatial Planning Directive [2014/89/EU]
	Nitrates Directive [91/676/EEC]
	Renewable Energy Directive [2009/28/EC]
	SEA Directive [2001/42/EC]
	Second European Climate Change Programme [ECCP II] 2005.
	Sewage Sludge Directive [86/278/EEC]
	Soils Thematic Strategy [COM(2006) 231]
	Urban Wastewater Treatment Directive [91/271/EEC]
	Water Framework Directive [2000/60/EC]
	Bathing Water Directive [2006/7/EC]
	World Heritage Convention [WHC-2005/WS/02]
	Environmental Noise Directive [2002/49/EC]
	The EU REACH Initiative Registration, Evaluation and Authorisation of Chemicals (REACH)
	OSPAR Convention – Convention for the Protection of the Marine Environment of the NE Atlantic
	Ramsar Convention - Convention on Wetlands of International Importance 1971 (amended 1982 and 1987)
	UN Convention on Biological Diversity (1992)

Level	Plan/Programme/Legislation
International and EU Level	Aarhus Convention
	The Stockholm Convention (2001)
	North Atlantic Salmon Conservation Organisation (NASCO), Convention for the Conservation of Salmon in the North Atlantic Implementation Plan for the period 2019-2024
	UN Kyoto Protocol
	Doha Amendment to the Kyoto Protocol
	The United Nations Framework
	Integrated Energy and Climate change package 2007
	UNESCO World Heritage Sites
National Level	**United Kingdom**
	UK Post 2012 Biodiversity Framework
	Civil Contingencies Act 2004
	Pollution and Prevention and Control Act 1999 (Integrates Directive (96/61/EC)
	Coast Protection Act 1949
	UK Marine Policy Statement
	Climate Change Act 2008
	National Climate Change Strategy 2007-2012 (including Adaption Framework)
	The Marine Strategy Regulations 2010
	UK Marine Strategy Part One: UK updated assessment and Good Environmental Status 2019
	UK Marine Strategy Part Two: UK Marine Monitoring Programmes 2021
	UK Marine Strategy Part Three: UK Programme of Measures 2015 (update due to be published in 2021)
	Northern Ireland
	NI FRMP 2015-2021
	The Water Environment (Floods Directive) Regulations (Northern Ireland) 2009 (SR 376/2009)
	The Water and Flood (Amendment) (Northern Ireland) (EU Exit) Regulations 2019
	The Wildlife and Natural Environment Act (NI) 2011
	The Wildlife (NI) Order 1985 and amendments.
	Offshore Marine Conservation (Natural Habitats etc.) Regulations (S.I. 2007/184)
	The Nature Conservation and Amenity Lands Order 1985 (NCALCO) as amended in the Environment Order (NI) 2002
	The Environment (NI) Order 2002
	The Conservation (Natural Habitats) Regulations (NI) 1995

Level	Plan/Programme/Legislation
National Level	The Conservation (Natural Habitats, etc.) (Amendment) (NI) (EU Exit) Regulations 2019
	Fisheries Act (Northern Ireland) 1966 as amended
	Valuing Nature – A Biodiversity Strategy for Northern Ireland to 2020 (DOENI 2015)
	Environmental Noise Regulations (Northern Ireland) 2006
	The Environment (Miscellaneous Amendments) (Northern Ireland) (EU Exit) Regulations 2019
	Regional Development Strategy 2035 Building a Better Future
	The Environmental Assessment of Plans and Programmes Regulations (Northern Ireland) 2004
	The Environmental Impact Assessment (Amendment) (Northern Ireland) (EU Exit) Regulations 2019
	The Water (NI) Order 1999
	Abstraction and Impoundment (Licensing) Regulations (Northern Ireland) 2006
	Control Of Pollution (Oil Storage) Regulations (NI) 2010
	The Water Environment (Water Framework Directive) Regulations (Northern Ireland) 2003
	The Water (Amendment) (Northern Ireland) (EU Exit) Regulations 2019
	The Surface Waters (Dangerous Substances) (Classification) Regulations (NI) 1998 (SR 397 of 1998)
	The Sludge (Use in Agriculture) Regulations (Northern Ireland) 1990
	The Groundwater Regulations (Northern Ireland) 2009
	The Industrial Pollution Control (Northern Ireland) Order 1997 (No. 2777 (N.I. 18))
	The Water (Northern Ireland) Order 1999 (No. 662 (N.I. 6))
	The Water and Sewerage Services (Northern Ireland) Order 2006
	The Urban Waste Water Treatment Regulations (Northern Ireland) 2007
	The Reservoirs Act (Northern Ireland) 2015
	The Water and Sewerage Services Act (Northern Ireland) 2016
	DRD Long Term Water Strategy
	Living with Water Programme
	Sustainable Water – A long Term Strategy for Northern Ireland (DfI 2016)
	Marine and Coastal Access Act 2009
	Northern Ireland State of the Seas report 2011
	The draft Marine Plan for Northern Ireland
	Marine Act (NI) 2013
	Climate Change Risk Assessment for Northern Ireland (2012)
	UK Climate Change Risk Assessment 3 (CCRA3) report (June 2021)

Level	Plan/Programme/Legislation
National Level	Greenhouse Gas Emissions Reduction Action Plan
	NI Climate Change Adaptation Programme 2019-2024 (NICCAP2) (2019)
	Environment Strategy for Northern Ireland – Public Discussion Document (DAERA 2019)
	Historic Monuments and Archaeological Objects (NI) Order 1995
	The Planning Act (NI) 2011
	A Planning Strategy for Rural Northern Ireland (DOE, 1993)
	Strategic Planning Policy Statement (DfI, September 2015)
	PPS 1 - General Principles (DOE, March 1998)
	PPS 2 - Planning and Nature Conservation (DOE, June 1997)
	PPS 4: Planning and Economic Development (DOE, November 2010)
	PPS 6 Planning, Archaeology and the Built Heritage
	PPS 8 -Open Space, Sport and Outdoor Recreation (DOE, 2004)
	PPS 13 – Transportation and Land Use (DRD, February 2005)
	Revised Planning Policy Statement 15 – Planning and Flood Risk
	PPS 21- Sustainable Development in the Countryside (DOE, June, 2010)
	Republic of Ireland
	Inland Fisheries Act 2010 (No. 10 of 2010)
	Flora Protection Order 1999
	European Communities (Birds and Habitats) Regulations 2011 (S.I. No. 477 of 2011)
	The Wildlife Act 1976 and The Wildlife (Amendment) Act 2000
	National Biodiversity Action Plan 2017-2021
	Local Government (Water Pollution) Act, 1977
	Water Quality Standards for Phosphorus) Regulations 1998 (SI 258 of 1998)
	Water Quality in Ireland 2005: Key indicators of the Aquatic Environment
	The Provision and Quality of Drinking Water in Ireland: A Report for the Year 2011
	Towards setting guideline values for the protection of groundwater in Ireland (2003)
	The Waste Management Act 1996 and amendments
Sub-Regional Level	Antrim Area Plan
	Ards and Down Area Plan 2015
	Armagh Area Plan 2004
	Ballymacoss Local Plan
	Ballymena Area Plan 1986-2001
	Banbridge, Newry and Mourne Area Plan 2015
	Bangor Town Centre Plan

Level	Plan/Programme/Legislation
Sub-Regional Level	Belfast Harbour Local Plan 1990-2005
	Belfast Metropolitan Area Draft Plan 2015
	Belfast Urban Area Plan 2001
	Carickfergus Area Plan 2001
	Carryduff Local Area Plan 1988-1993
	Cookstown Area Plan 2010
	Craigavon Area Plan 2010
	Craigavon Town Centre Boundaries and Retail Designation Plan 2010
	Derry Area Plan 2011
	Dungannon and South Tyrone Area Plan 2010
	Fermanagh Area Plan 2007
	Houses in Multiple Occupation (HMO's) Subject Plan for Belfast City Council Area 2015
	Lagan Valley Regional Park Local Plan 2005
	Larne Area Plan 1984-2010
	Lisburn Area Plan 2001
	Lisburn Town Centre Local Plan
	Magherafelt Area Plan 2015
	Newtownabbey Draft Area Plan 2005
	North Down and Ards Area Plan 1984-1995
	Northern Area Plan 2016
	Omagh Area Plan 1987-2002
	Strabane Area Plan 1986-2001
	Antrim and Newtownabbey Borough Council Local Development Plan draft Plan Strategy 2030 (submitted to DfI for examination March 2021)
	Ards and North Down Borough Council Local Development Plan Preferred Options Paper (March 2019) and draft Plan Strategy 2030 (in prep.)
	Armagh City, Banbridge and Craigavon Borough Council Local Development Plan Preferred Options Paper (March 2018) and draft Plan Strategy 2030 (in prep.)
	Belfast City Council Local Development Plan draft Plan Strategy 2035 (submitted to DfI for examination August 2019)
	Causeway Coast and Glens Borough Council Local Development Plan 2030 Preferred Options Paper (June 2018) and draft Plan Strategy (in prep.)
	Derry City and Strabane District Council Local Development Plan 2032 draft Plan Strategy (December 2019)
	Fermanagh and Omagh District Council Local Development Plan 2030 draft Plan Strategy October 2018 (submitted to DfI December 2020)

Level	Plan/Programme/Legislation
Sub-Regional Level	Lisburn and Castlereagh City Council Local Development Plan 2032 draft Plan Strategy October 2019 (submitted to DfI March 2021)
	Mid and East Antrim Borough Council Local Development Plan 2030 draft Plan Strategy September 2019 (submitted to DfI March 2021)
	Mid Ulster District Council Local Development Plan 2030 draft Plan Strategy February 2019 (submitted to DfI May 2021)
	Newry, Mourne and Down District Council Local Development Plan 2030 Preferred Options Paper June (2018) and draft Plan Strategy (in prep.)

5 Monitoring of Effects on Sea Topics from Implementation of the 1st Cycle FRMPS 2015-2021

5.1 Monitoring measures proposed for the 1st cycle NI FRMPs

The SEA Environmental Report for the 1st cycle Northern Ireland FRMPs 2015-2021 set out a framework that could be used to monitor any significant effects on the environment arising from implementation of the Plans. As there are uncertainties associated with strategic-level assessment of Plans, monitoring enables a periodic check in order to confirm the accuracy of any assumptions on which the original assessment was based, and to ensure that mitigation measures that were proposed are being effectively implemented and also remain relevant.

The purpose of SEA environmental monitoring is to enable measurement of the following:

- A change in the environmental baseline that will indicate the effects of the plans;
- The significant effects that have been identified during the assessment;
- Whether the mitigation measures proposed to offset or reduce the significant effects have been implemented and are effective; and
- Any unforeseen impacts that have occurred.

The monitoring framework proposed in the SEA Environmental Report for the 1st cycle NI FRMPs set out the proposed measures against the SEA topics **(Table 5-1)**. The recommended data sources for measures were based on relevant existing monitoring arrangements, where these were available.

Table 5-1: Monitoring measures for SEA topics as outlined in the SEA Environmental Report for the NI FRMPs 2015-2021

SEA Topic	Proposed Measures	Proposed Data Source
Biodiversity, Flora and Fauna	Protected sites and species are monitored with regards to their conservation objectives. Any increase in unfavourable/ favourable conditions will be monitored in conjunction with the implementation of flood risk management projects as well as any habitat loss/increase.	NIEA carry out monitoring of designated sites and this information will be used.
Cultural Heritage	Historical sites (monuments, listed buildings, archaeological sites, etc.) should be appropriately documented where they are lost or relocated as a result of the implementation of flood risk management infrastructure.	NIEA[47] could provide this information, as they will have been consulted on a statutory basis in such circumstances.
Water	Water quality will be monitored by the NIEA under the requirements of the Water Framework Directive (WFD). Where the implementation of flood risk management infrastructure will result in modifications to services associated with infrastructure such as sewers or pumping stations further studies should be carried out to ensure these are not impacting on the water quality of water features within Northern Ireland.	NIEA assess the status of waterbodies for WFD, including water quality.

[47] The Department for Communities (DfC) are now the responsible authority for cultural heritage

SEA Topic	Proposed Measures	Proposed Data Source
Geology and Soil	The condition and quality of designated sites of geological importance (ASSIs) is subject to ongoing monitoring. This should be reviewed in conjunction with the flood risk management projects.	NIEA carry out monitoring of designated sites and this information will be used.
Population and Human Health	The potential nuisance (noise) effects of flood risk management construction should be monitored. Where flood risk has been identified by modelling, but not verified through historic events, these areas should be monitored to assess if their flood risk potential has been enhanced.	Construction noise can be monitored as part of specific project management. This can be done in-house by Rivers Agency[48] .
Material Assets	Benefits from implemented flood risk management measures should be monitored. Rivers Agency will assess the cost benefit of a range of measure types prior to the selection of preferred option. Potential effects on private dwellings associated with single property protection advocated in FRMP should be monitored.	Rivers Agency[2] will assess the benefits of any flood alleviation scheme. Post event evaluations will be carried out as required. Rivers Agency will assess the benefits of any flood alleviation scheme.
Climate Factors	The Climate Change Adaptation Programme (CCAP) provides the proposals and policies by which government departments (including the Department for Agriculture and Rural Development (DARD)) will meet climate change objectives.	This should include an audit mechanism for target meeting.
Landscape	Sustainable Drainage Systems (SuDS) is considered a long term strategy for the management of surface water flooding.	The endorsement of the use of SuDS in the development of future legislation should include the necessary formal monitoring arrangements.

Table 5-2, **Table 5-3** and **Table 5-4** summarise the progress made to date in the implementation of the Significant Flood Risk Area (SFRA) site-specific measures outlined in the FRMPs for each of the three River Basin Districts (RBDs). Areas of existing or foreseeable future potentially significant flood risk were referred to in the 1st cycle FRMPs 2015-2021 as 'Significant Flood Risk Areas' (SFRAs) and are synonymous with 'Areas of Potential Significant Flood Risk' (APSFR). Monitoring of effects on SEA topics from implementation of the flood risk management measures is only feasible for physical activities i.e. the construction and operation of Flood Alleviation Schemes (FASs), as both studies and communications activities are unlikely to have any measurable impacts on the environment. Three site-specific FASs have been completed, to date, during the 1st cycle FRMPs 2015-2021; two schemes have been completed in the Belfast SFRA and one in the Newtownabbey SFRA. The East Belfast Flood Alleviation Scheme (EBFAS) was planned and implemented in conjunction with the Connswater Community Gateway (CCG) Project, an urban regeneration project whose objective was to create a 9km linear park through East Belfast, following the course of the Connswater, Knock and Loop Rivers, and connecting the open and green spaces.

[48] DfI Rivers are now the responsible authority

Table 5-2: Progress on implementation of site-specific Measures – North-Western RBD

Measure Code	Measure Name	Timetable	Priority	Progress
Omagh SFRA				
UKNI_NW_APSFR_02_01	Omagh Fluvial Flood Risk Assessment and FAS	2015-2021	High	Omagh Feasibility Study Complete
UKNI_NW_APSFR_02_02	Omagh Community Resilience Group	Group established 2015/16 and ongoing	High	Completed 2016
UKNI_NW_APSFR_02_03	Killyclogher Burn & Mullaghmore Burn - FAS	2015-2021	Moderate	Not started
UKNI_NW_APSFR_02_04	Dromore Road Stream - FAS	2015-2021	Low	Not started
UKNI_NW_APSFR_02_05	Fairy Water & Strule River - FAS	2015-2021	Low	Not started
Strabane SFRA				
UKNI_NW_APSFR_03_01	Urney Road Drain & Extension, Designated Watercourses - FAS	2021-	Low	Not started
UKNI_NW_APSFR_03_02	Urney Road Undesignated Watercourses - FAS	2021-	Low	Not started
UKNI_NW_APSFR_03_03	River Mourne - FAS	2021-	Low	Not started
UKNI_NW_APSFR_03_04	Park Road Drain - FAS	2021-	Low	Not started
UKNI_NW_APSFR_03_05	Roundhill Drain - FAS	2021-	Low	Not started
Londonderry SFRA				
UKNI_NW_APSFR_01_01	Ardnabrocky, Ardnabrocky Drain - FAS	2021-	Moderate	Feasibility study ongoing
UKNI_NW_APSFR_01_02	Lower Tullyally, Burnagibbagh - FAS	2021-	Moderate	Feasibility study ongoing
UKNI_NW_APSFR_01_03	Waterside, Woodburn Park Stream - FAS	2021-	Low	Feasibility study ongoing
UKNI_NW_APSFR_01_04	Springtown, Pennyburn Stream - FAS	2021-	Low	Feasibility study ongoing
UKNI_NW_APSFR_01_05	Creggan, Creggan Burn - FAS	2021-	Low	Feasibility study ongoing
UKNI_NW_APSFR_01_06	Foyle Coastal Study	2021	Low	Feasibility study ongoing
UKNI_NW_APSFR_01_07	Foyle Coastal Emergency Response Plan	2015-2021	Low	Completed

Table 5-3: Progress on implementation of site-specific Measures – Neagh-Bann RBD

Measure Code	Measure Name	Timetable	Priority	Progress
Newry SFRA				
UKNI_NB_APSFR_01_01	Newry River - FAS	Feasibility Study by 2016: Construction by 2021	High	Feasibility Study completed 2017 - complex design process envisaged
UKNI_NB_APSFR_01_02	Bridge Street/ Cleary Crescent - Establishment of local community resilience group	Group established 2015/16 and ongoing	Moderate	Completed 2016
UKNI_NB_APSFR_01_03	Coastal - FAS	Feasibility Study by 2016: Construction by 2021 if viable	High	Feasibility Study completed - no viable scheme
UKNI_NB_APSFR_01_04	Coastal Emergency Response Plan	Complete 2016	Moderate	Completed
Portadown SFRA				
UKNI_NB_APSFR_02_01	Upper Bann River/ Annagh River - FAS	Feasibility Study by 2019: Construction post 2021 (next FRMP cycle) if viable	Moderate	Feasibility Study completed
UKNI_NB_APSFR_02_02	Upper Bann River/ Ballybay River - FAS	Feasibility Study by 2019: Construction post 2021 (next FRMP cycle) if viable	Moderate	Feasibility Study completed
UKNI_NB_APSFR_02_03	Upper Bann River/ Ballybay River - Establishment of local community resilience group	2017-2021	Moderate	Not started
UKNI_NB_APSFR_02_04	Upper Bann River/ Ballynagowan River - FAS	Complete 2016	Moderate	Feasibility Study completed

Measure Code	Measure Name	Timetable	Priority	Progress
Ballymena SFRA				
UKNI_NB_APSFR_03_01	Ballee Burn - FAS	Feasibility Study by 2019: Construction post 2021 (next FRMP cycle) if viable	Moderate	Not started
UKNI_NB_APSFR_03_02	Mill Layde Lower - FAS	Feasibility Study by 2019: Construction post 2021 (next FRMP cycle) if viable	Moderate	Not started
UKNI_NB_APSFR_03_03	River Braid - FAS	Pre-feasibility by 2021: Construction post 2021 if viable	Low	Not started
UKNI_NB_APSFR_03_04	Ballykeel - Establishment of local community resilience group	2017-2021	Moderate	Not started
Warrenpoint SFRA				
UKNI_NB_APSFR_04_01	Clonallan Stream Extension - FAS	Feasibility Study post 2021	Low	Not started
UKNI_NB_APSFR_04_02	Milltown Stream - FAS	Feasibility Study post 2021	Low	Not started
UKNI_NB_APSFR_04_03	Coastal - FAS	Feasibility Study by 2021: Construction post 2021, if viable	Moderate	Not started
Antrim SFRA				
UKNI_NB_APSFR_05_01	Sixmilewater 1 - FAS	Design by 2016: Construction by 2018	High	Not started
UKNI_NB_APSFR_05_02	Muckamore - Establishment of local community resilience group	Group established 2015/16 and ongoing	Low	Completed
UKNI_NB_APSFR_05_03	Hollywell Burn - FAS	Design by 2016: Construction by 2018	High	Design ongoing
UKNI_NB_APSFR_05_04	Sixmilewater 2 - FAS	Design by 2016: Construction by 2018	High	Not started
UKNI_NB_APSFR_05_05	Riverside & Masserene - Establishment of local community resilience group	Group established 2015/16 and ongoing	Low	Completed

Measure Code	Measure Name	Timetable	Priority	Progress
Banbridge SFRA				
UKNI_NB_APSFR_06_01	Showgrounds Stream - FAS	Construction by 2020	High	Not started
UKNI_NB_APSFR_06_02	Banbridge Town Culvert - FAS	Pre-feasibility by 2021: Construction post 2021 (next FRMP Cycle) if viable	Low	Not started
UKNI_NB_APSFR_06_03	Continue with established local community resilience group	Group established 2014/15 and ongoing	High	Completed
UKNI_NB_APSFR_06_04	Rifle Park Stream - FAS	Pre-feasibility by 2021: Construction post 2021 (next FRMP Cycle) if viable	Low	Not started
UKNI_NB_APSFR_06_05	Brookefield Stream - FAS	Feasibility by 2020: Construction post 2021 (next FRMP Cycle) if viable	Low	Not started
Coleraine SFRA				
UKNI_NB_APSFR_07_01	Lower Bann River - No specific mitigation measures proposed	Feasibility Study post 2021	Moderate	Not started
Glengormley SFRA				
UKNI_NB_APSFR_08_01	Glengormley, Ballymartin River and tributaries - FAS	Construction by 2021	High	Feasibility study completed

Measure Code	Measure Name	Timetable	Priority	Progress
Lurgan SFRA				
UKNI_NB_APSFR_09_01	Clanrolla Stream - FAS	Feasibility Study by 2019: Construction post 2021 (next FRMP cycle) if viable	High	Feasibility study completed March '18
UKNI_NB_APSFR_09_02	Westwood/Sperrin Drive - Establishment of local community resilience group	2017-2021	Moderate	Not started
UKNI_NB_APSFR_09_03	Halfpenny River - FAS	Feasibility Study by 2019: Construction post 2021 (next FRMP cycle) if viable	High	Completed 2010
UKNI_NB_APSFR_09_04	Knockramer Meadows/ Silverwood Leaves - Establishment of local community resilience group	2017-2021	Moderate	Not started
UKNI_NB_APSFR_09_05	Tirsogue Drain - FAS	Pre-feasibility by 2021: Construction post 2021 if viable	Low	Completed 2011

Table 5-4: Progress on implementation of site-specific Measures – North-Eastern RBD

Measure Code	Measure Name	Timetable	Priority	Progress
Belfast SFRA				
UKNI_NE_APSFR_01_01	Belfast Tidal Flood Risk Study - FAS	Feasibility Study by 2016: Construction by 2021	High	Design - ongoing
UKNI_NE_APSFR_01_02	Develop and implement Coastal Emergency Response Plan	Complete 2016	High	Completed
UKNI_NE_APSFR_01_03	East Belfast Flood Alleviation Scheme (FAS)	Completion of Construction by 2016	High	Completed 2019
UKNI_NE_APSFR_01_04	Glenmachan Project - Phase 1a (Sicily Park/ Marguerite Park) & Phase 2 (Greystown/ Upper Malone)	Completion of Construction by 2017	High	Greystown / Upper Malone – Completed 2019. Sicily Park - Not started.
UKNI_NE_APSFR_01_05	Living with Water Programme - Strategic Drainage Infrastructure Programme (SDIP) for Belfast	Development of SDIP by 2018: Construction works by 2026 were viable.	High	Development of SDIP – Ongoing
UKNI_NE_APSFR_01_06	Cregagh - Establishment of Local Community Resilience Group	Group established 2014/15 and ongoing	High	Completed
UKNI_NE_APSFR_01_07	Establishment of Local Community Resilience Groups	2017-21	Moderate	Ongoing
Newtownards SFRA				
UKNI_NE_APSFR_02_01	Ballycullen Stream - FAS	Feasibility Study by 2019; Construction post 2021 if viable	Low	Not started
Carrickfergus & Kilroot Power Station SFRA				
UKNI_NE_APSFR_03_01	Northwest/ Northeast Diversions and associated watercourses - FAS	Feasibility Study by 2018; Construction post 2021 if viable	Low	Not started

Measure Code	Measure Name	Timetable	Priority	Progress
Bangor SFRA				
UKNI_NE_APSFR_04_01	Northwest/ Northeast Diversions and associated watercourses - FAS	Feasibility Study by 2019; Construction post 2021 if viable	Low	Not started
Newcastle SFRA				
UKNI_NE_APSFR_05_01	Shimna River - FAS	Design by 2016; Construction by 2019	High	Design - ongoing
UKNI_NE_APSFR_05_02	Mourneview Urban Drainage Improvements	Design and Construction by 2016	High	Not started
UKNI_NE_APSFR_05_03	Establishment of Local Community Resilience Group	2017-21	Moderate	Not started
Newtownabbey SFRA				
UKNI_NE_APSFR_06_01	Concrete Row Stream - FAS	Design by 2018; Construction by 2021	High	Completed 2018
UKNI_NE_APSFR_06_02	Greenisland Stream - FAS	Feasibility Study by 2016; Construction by 2021 if viable	High	Not started
UKNI_NE_APSFR_06_03	Three Mile Water - FAS	Feasibility Study by 2019; Construction by 2021 if viable	Moderate	Not started
UKNI_NE_APSFR_06_04	Jointure Bay Stream - FAS	Feasibility Study by 2019; Construction by 2021 if viable	Moderate	Not started
Downpatrick SFRA				
UKNI_NE_APSFR_07_01	Integrated Urban Drainage Study	Feasibility Study by 2018; Construction by 2021 if viable	Moderate	Not started
Dundonald SFRA				
UKNI_NE_APSFR_08_01	River Enler & tributaries - FAS	Feasibility Study by 2019; Construction post 2021 if viable	Low	Not started

5.2 Monitoring effects on Biodiversity, Flora and Fauna

Chapter 9 of the SEA Environmental Report for the 1st cycle FRMPs 2015-2021 proposed that monitoring of 'Biodiversity, Flora and Fauna' could entail an assessment of any changes in the conservation condition (i.e. unfavourable/favourable) of protected habitats and species, based on information from the Northern Ireland Environment Agency's (NIEA) monitoring of designated sites.

The most recent status of priority and protected habitats and species across Northern Ireland is discussed in Section 3.2.1 of this report. Three site-specific FASs have been completed, to date, during the 1st cycle FRMPs 2015-2021; two schemes have been completed in the Belfast SFRA and one in the Newtownabbey SFRA. **Table 5-5** outlines these schemes and the national and international designated sites associated with these SFRAs. All of the associated European sites are designated for the presence of bird species. Strategic-level monitoring of the conservation status and trends of bird species for which the SPAs were designated during part of the FRMPs period (i.e. 2015-2018) can be supported by the results of the 11th UK report. Belfast Lough SPA was designated for the presence of a wintering population of Redshank (Tringa tetanus), while Belfast Lough Open Water SPA was designated for the presence of a wintering population of Great Crested Grebe (Podiceps cristatus). Annex B of the 11th UK Article 12 Report comprises a Bird Species Status and Trends Report containing individual assessments for 268 bird species in metropolitan UK that are subject to the protection measures entailed in the Birds Directive. This indicates that, for wintering Redshank, the short-term population trend (2004-2016) is decreasing, while the long-term population trend (1980-2016) is stable. For wintering Great Crested Grebe, the short-term population trend (2005-2016) is decreasing while the long-term population trend (1984-2016) is increasing. The latest Condition Assessment (2014) for the Redshank population of Belfast Lough SPA indicates that it is currently at 'unfavourable' conservation status (DAERA 2015a). Threats to the species at this site include changes in the extent and quality of intertidal and open-water habitats, presence of adjoining habitat and coastal protection schemes. The latest Condition Assessment (2014) for the Great Crested Grebe population of Belfast Lough Open Water SPA indicates that it is currently at 'favourable' conservation status (DAERA 2015b). Threats to the species at this site include changes in the extent and quality of intertidal and open-water habitats and disturbance from open water activities (aquaculture, recreational boating, etc.). It is not anticipated that the FASs completed, to date, from the 1st cycle FRMPs 2015-2021, have had any effect on the short-term trends of these bird species. The Concrete Row Stream FAS in the Newtownabbey SFRA and the Glenmachan Project – Phase 2 FAS in the Belfast SFRA were small in scale and duration, while the EBFAS did not involve any coastal protection works that could result in disturbance to the species.

Table 5-5: Site-specific Flood Alleviation Schemes completed to date and associated designated sites

SFRA	Scheme Name	Designated Sites – European sites and associated ASSIs
Belfast	East Belfast FAS - Phase 1, Phase 2 and Standalone measures	Belfast Lough Open Water SPA Belfast Lough SPA & Ramsar Inner Belfast Lough ASSI Outer Belfast Lough ASSI East Coast Marine pSPA
Belfast	Glenmachan Project - Phase 2 (Greystown/Upper Malone)	Belfast Lough Open Water SPA Belfast Lough SPA & Ramsar Inner Belfast Lough ASSI Outer Belfast Lough ASSI East Coast Marine pSPA
Newtownabbey	Concrete Row Stream	Belfast Lough Open Water SPA Belfast Lough SPA & Ramsar Inner Belfast Lough ASSI Outer Belfast Lough ASSI East Coast Marine pSPA

Recommendations for monitoring effects on Biodiversity, Flora and Fauna from implementation of the 2nd cycle FRMP 2021-2027:

- Monitoring of likely significant effects on biodiversity, flora and fauna should continue on a project by project basis as particular FASs are developed and advanced, through the project level Environmental Impact Assessment (EIA) process. This should include an assessment of likely significant effects on designated sites as well as on local biodiversity. The Natural Environment Division (NED) should be liaised with through the statutory consultation process.
- The Conservation (Natural Habitats, etc.) (Amendment) (Northern Ireland) (EU Exit) Regulations 2019, required to ensure that the 1995 Habitats Regulations that transposed the Habitats Directive and certain elements of the Wild Birds Directive into Northern Ireland legislation remained operable following the UK's exit from the EU, created a national site network within the UK, comprising the protected sites already designated under the Nature Directives, and any further sites designated under these Regulations. Reporting will no longer be required to the European Commission, however DAERA will report periodically every 6 years following exit from the EU. The first of these reports is due in 2026 and will outline any changes in the UK within the timeframe of the remainder of the 1st cycle FRMPs as well as part of the 2nd cycle FRMP. It is recommended that, when available, these reports are used to monitor any changes in the status of designated habitats or species within SACs, or in the status of designated bird species within SPAs, and to establish whether any changes could be associated with impacts arising from implementation of FASs. Environmental Statistics Reports for Northern Ireland are updated on an annual basis. It is recommended that the most up to date report is used to compare any changes in the conservation status of species or habitats within national designated sites during the timeframe of the FRMP. The most up to date Condition Assessment

reports for designated sites can also provide up to date information on the status of, and current threats to, designated features within any potentially affected sites.

- There is potential for trans-boundary habitats and species to be affected by upstream projects. Affected sites and species that operate on or are dependent on cross-border nature conservation features should be monitored using data from appropriate data sources in both jurisdictions (i.e. NIEA and NPWS).
- The protection of European sites within the Republic of Ireland is underpinned by the European Communities (Birds and Habitats) Regulations 2011 (ROI S.I. No. 477 of 2011). The 5th UK Habitats Directive Report (Article 17 reporting), and the 12th UK Report for Article 12 of the EU Birds Directive, are due in 2025. These will outline any changes in the Republic of Ireland within the timeframe of the remainder of the 1st cycle FRMPs as well as part of the 2nd cycle FRMP. It is recommended that, when available, these reports are used to monitor any changes in the status of designated habitats or species within SACs, or in the status of designated bird species within SPAs, and to establish whether any changes could be associated with transboundary impacts arising from implementation of FASs.
- Monitoring is undertaken by the Marine and Fisheries Division of DAERA to satisfy the requirements of the UK Marine Strategy to achieve GES for the 11 quality descriptors and monitor the prevailing conditions supporting assessment of GES. The assessment of the marine waters within the MS area are periodically reviewed and updated, and the results published every 6 years. The updated UK Marine Strategy Part 1 was published in 2019, and the next update is due to be published in 2025. It is recommended that the most up to date report is used to compare any changes in the achievement of targets for relevant quality descriptors during the timeframe of the FRMP, including those for underwater noise, which has the potential to disturb protected and priority marine species.

5.3 Monitoring effects on Population and Human Health

Chapter 9 of the SEA Environmental Report for the 1st cycle FRMPs 2015-2021 proposed that the potential nuisance (noise) effects of flood risk management construction should be monitored, and that this could be carried out as part of specific project management. It is recommend that this can more appropriately be dealt with at project level. At the detailed feasibility and design stage of any FAS, the Drainage (Environmental Impact Assessment) Regulations (Northern Ireland) 2006 require the proposals and approaches to undergo assessment, to include a requirement for monitoring of construction noise where this has been considered as a potentially significant effect of the proposal.

The implementation of Flood Risk Management measures directly protects the population of these areas against flooding, and the number of individuals directly protected can be monitored, as well as the cost benefit attributable to the schemes. **Table 5-6** outlines the FASs that have been completed for the SFRAs outlined in the 1st cycle FRMPs, the number of properties protected by these schemes, average household size in these areas (based on the Northern Ireland Census of 2011), and the approximate number of individuals that this equates to. The FAS for the Newtownabbey SFRA at Concrete Row stream was estimated to provide protection to 29 properties, equating to approximately 70 individuals during a 1% AEP fluvial flood event. Phase 1 of the EBFAS was estimated to provide protection to 259 properties, equating to approximately 593 individuals during a 1% AEP fluvial flood event. Phase 2 of the EBFAS was estimated to provide protection

to 1,264 properties, equating to approximately 2,895 individuals during a 0.5% AEP tidal flood event, and to 126 properties equating to approximately 289 individuals during a 1% AEP fluvial flood event. Phase 3 of the EBFAS was estimated to provide protection to 80 properties, equating to approximately 183 individuals during a 1% AEP fluvial flood event. Phase 2 (Greystown/Upper Malone) of the Glenmachan project in the Belfast SFRA was estimated to provide protection to 19 properties, equating to approximately 44 individuals during a 1% AEP flood event.

Table 5-6: Assessment of the number of individuals protected by completed Flood Alleviation Schemes

Scheme Name	No. of properties protected (approx.)[49]	Average household size[50]	No. of individuals protected (approx.)
Belfast; East Belfast Flood Alleviation Scheme (FAS) - Phase 1	259 (fluvial)	2.29	593
Belfast; East Belfast Flood Alleviation Scheme (FAS) - Phase 2	1,264 (tidal) 126 (fluvial)	2.29	2,895 289
Belfast; East Belfast Flood Alleviation Scheme (FAS) - Phase 3	80 (fluvial)	2.29	183
Belfast; Glenmachan Project - Phase 2 (Greystown/Upper Malone)	19 (fluvial)	2.29	44
Newtownabbey; Concrete Row Stream	29 (fluvial)	2.43	70

As discussed previously, the EBFAS was planned and implemented in conjunction with the CCG Project and, although all the benefits arising from the CCG Project cannot be directly attributed to the EBFAS, the flood alleviation works facilitated the CCG Project and consequently its benefits. The CCG had the ambition to improve the quality of life of people in the area, through the creation of parkland for leisure, recreation, community events and activities. The scheme was situated, in part, within the Inner East Belfast Neighbourhood Renewal Area, with potential to provide protection from flooding, and improved conditions within deprived areas. The Final Evaluation report, released in September 2017, reviewed progress through evaluation of project outcomes against a set of Key Performance Indicators[51]. Evaluation of the level of community engagement achieved indicated that all five of the targets were exceeded and, in four cases, greatly exceeded. Initial results from the Physical Activity, Health and Wellbeing component of the evaluation were below the targets anticipated over the short time period monitored. The number of pedestrians, cycle users and anglers increased by 0.7% compared to the baseline figure but fell short of the target level. The evaluation report concluded that longer-term monitoring would be necessary to further investigate the impact of the CCG on the health and wellbeing of local residents.

[49] Protection is estimated at the level of a 1% AEP fluvial event, or a 0.5% AEP tidal flood event.

[50] Average household size as estimated by the NI Census 2011 for Belfast City and Metropolitan Newtownabbey.

[51] https://www.connswatergreenway.co.uk/sites/default/files/CCG%20-%20Evaluation%20Report%202019%20FINAL.pdf

Recommendations for monitoring effects on Population and Human Health from implementation of the 2nd cycle FRMP 2021-2027:

- Monitor the cost benefit attributable to completed FASs;
- Assess the number of people protected by completed FASs.

5.4 Monitoring effects on Geology, Soils and Landuse

Chapter 9 of the SEA Environmental Report for the 1st cycle FRMPs 2015-2021 proposed that monitoring of 'Geology and Soil' could entail an assessment of any changes in the condition and quality of designated sites of geological importance (ASSIs), based on information from the Northern Ireland Environment Agency's (NIEA) monitoring of designated sites. As discussed in Section 3.1, Section 6 of the Environmental Statistics Report 2019, monitoring of the condition of features within ASSIs for the six year rolling period ending March 2018 indicated that 61% of features were in Favourable condition, 3% in Unfavourable-Recovering and 36% in Unfavourable condition, remaining very similar to the previous 10 years of reporting. **Table 5-5** outlines the FASs that have been completed for the SFRAs outlined in the 1st cycle FRMPs, and the designated sites associated with these areas. There have been no reports of impacts on the Outer Belfast Lough ASSI, which is downstream of these three schemes. No other ASSIs designated for features of geological importance are located in the vicinity of the completed FASs, and there has therefore been no other potential for impact.

Recommendations for monitoring effects on Geology and Soil from implementation of the 2nd cycle FRMP 2021-2027:

- Monitoring of likely significant effects on a project by project basis should continue as particular FASs are developed and advanced, through the project level EIA process. This should include an assessment of likely significant effects on designated sites, including those ASSIs designated for geological features. Project level EIA should also assess and monitor any risks to geology and soil from development of FASs.

5.5 Monitoring effects on Water

Chapter 9 of the SEA Environmental Report for the 1st cycle FRMPs 2015-2021 proposed that monitoring of water quality could be based on the data compiled by NIEA for assessing the status of waterbodies for the Water Framework Directive (WFD), which includes water quality. The most up to date status of WFD surface water bodies in Northern Ireland is discussed in Section 3.2.4 of this report.

The available interim water quality statistics were produced as an overall national assessment, and cannot be associated with the specific areas where FASs have been completed during the 1st cycle FRMPs, i.e. at the Newtownabbey and Belfast SFRAs. The Water Management Unit of DAERA was consulted regarding any knowledge of degradation or improvements in water quality in these areas within the Plan period. They provided the raw data for interim assessment of river water body status in 2018, on which the national statistics, discussed in Section 3.2.4 of this report, were based. These were used to compare the 2015 WFD status with updated 2018 interim WFD status for river water bodies associated with the completed FASs. In the Newtownabbey SFRA, a

FAS was completed for the Concrete Row stream; this is a minor water body and there are no WFD monitoring points for which a comparison can be made. In the Belfast SFRA, the EBFAS comprised work on the Connswater River system; this water body was given a 'Poor' surface water status in both 2015 and 2018. Phase 2 of the Glenmachan Project FAS involved work in the Greystown/ Upper Malone area of the Belfast SFRA. This area is in the Blackstaff (Belfast) River Catchment; this river body was given a 'Moderate' water quality status in both 2015 and 2018. Therefore, there is no indication of any degradation or improvement in water quality of WFD monitored water bodies associated with the completed FASs.

Recommendations for monitoring effects on Water from implementation of the 2nd cycle FRMP 2021-2027:

- The draft 3rd cycle RBMP for Northern Ireland 2021-2027 will be finalised later in 2021 and will outline any changes in Northern Ireland within the timeframe of the FRMP. It is recommended that, when available, this report, and the updated classification of WFD water bodies, is used to monitor any changes in the status of water bodies and establish whether any changes could be associated with impacts arising from implementation of the FRMPs.
- Monitoring is undertaken by the Marine and Fisheries Division of DAERA to satisfy the requirements of the UK Marine Strategy to achieve GES for the 11 quality descriptors and monitor the prevailing conditions supporting assessment of GES. The assessment of the marine waters within the MS area are periodically reviewed and updated, and the results published every 6 years. The updated UK Marine Strategy Part 1 was published in 2019, and the next update is due to be published in 2015. It is recommended that the most up to date report is used to compare any changes in the achievement of targets for relevant quality descriptors during the timeframe of the FRMP.

5.6 Monitoring effects on Climatic Factors

Chapter 9 of the SEA Environmental Report for the 1st cycle FRMPs 2015-2021 proposed that the Climate Change Adaptation Programme (CCAP) should include an audit mechanism for target meeting.

The CCAP provides the proposals and policies by which Northern Ireland's Government Departments will meet climate change objectives. Section 60 (Part 4) of the UK Climate Change Act 2008 requires Departments to set out objectives, proposals, policies and associated timelines to address the risks and opportunities that were identified in the 1st Climate Change Risk Assessment (CCRA) for Northern Ireland. It also requires an assessment of the progress that has been made towards implementing the objectives, proposals and policies. The first Northern Ireland CCAP[52] outlined the Government's response to the CCRA for Northern Ireland. An Adaptation Subgroup of the Cross-Departmental Working Group on Climate Change (CDWG CC) was tasked with delivering the Adaption Programme, including annual progress reports on its implementation. Chapter 7 of the CCAP considered the use of 'Adaptation Indicators' that could be used by the CDWG CC as a tool for assessing progress on climate change adaptation.

[52] https://www.nienvironmentlink.org/cmsfiles/policy-hub/files/documentation/Climate/ni_climate_change_adaptation_programme__niap__-_pdf_for_web_page_-_jan_2014.pdf

The Climate Change Unit of DAERA has now published an updated Northern Ireland CCAP for the period 2019 – 2024 (NICCAP2). The NICCAP2 identified five key priority areas:

- Natural Capital, including Terrestrial/Coastal/Marine/Freshwater ecosystems, soils and biodiversity (NC);
- Infrastructure services (IF);
- People and built environment (P);
- Disruption to businesses and supply chains (B); and
- Food Security/Global food production (I).

Chapter 15 of this report evaluates the implementation of the 1st Programme (NICCAP1). Annex A outlines the 'Government delivery plans', detailing the strategies, policies and action for implementation for each key priority area. This includes, for each identified key priority area: the relevant vision for the outcome objective, the relevant indicators, list of actions with implementation timelines and responsible named department and NI Evidence Report Climate Change risks/opportunities to which the relevant action contributes to addressing. Monitoring of NICCAP2 implementation will be through a mid-programme review that will assess the progress of actions implemented/still to be implemented, the effectiveness of adaptation indicators and progress on delivery of the outcome objectives. In addition, in February 2019 DfI published the "Technical Flood Risk Guidance in Relation to Allowances for Climate Change in Northern Ireland". This sets out DfI Roads and Rivers and NI Water's approaches to allowing for climate change in the design of their respective road drainage, storm drainage and river infrastructure. It will also act as a guide for those involved in managing flood risk in relation to development planning and management. Following the formation of DfI, the responsibility for implementation of the FRMPs for Northern Ireland now rests with this Department.

Further to the above assessment of the CCAP, and in order to enable measurable monitoring within the FRMP cycle, the capacity of completed FASs to manage climate change effects can be assessed. The effects of climate change should be effectively managed through the implementation of Flood relief management measures. The Floods Regulations[53], make it a legal requirement for Climate Change to be considered in the assessment of flood risk. The number of individuals protected from flooding by the FASs completed during the 1st cycle FRMPs was estimated as detailed in **Table 5-6**. The completed FASs were subject to a sensitivity test for climate change, however up to date guidance regarding climate change adaptability was not available at the time of scheme development. New design guidance that takes climate change into account was issued in February 2019[54] , and this will be followed during the implementation of any new FASs. This guidance document consolidated and, where appropriate, updated previously existing guidance on allowances for Climate Change in relation to design of drainage and flood risk management infrastructure and was designed to assist engineers and other professionals in their considerations of flood risk. This will facilitate monitoring the adaptability of completed FASs to climate change effects, to include the area and number of properties and other assets benefitting from the schemes.

[53] https://www.legislation.gov.uk/nisr/2009/376/contents/made

[54] https://www.infrastructure-ni.gov.uk/sites/default/files/publications/infrastructure/technical-flood-risk-guidance-in-allowances-for-climate-change-6feb19.PDF

Recommendations for monitoring effects on Climate Factors from implementation of the 2nd cycle FRMP 2021-2027:

- Monitor the number of completed FASs that were designed to be adaptable to climate change projections;
- Assess the number of properties, people and other assets protected against the effects of climate change by completed FASs;
- The mid-programme review of NICCAP2 will be due in 2022. It is recommended that, when available, this report is used to monitor the effectiveness of any adaptation indicators relevant to the FRMPs.

5.7 Monitoring effects on Material Assets

Chapter 9 of the SEA Environmental Report for the 1st cycle FRMPs 2015-2021 proposed that the potential effects on 'Material Assets' be monitored through assessment of the benefits of any FAS, including post-event evaluations as required. For monitoring the effects of implementation of the 1st cycle FRMPs, this includes the cost benefits, the number of properties protected and any infrastructure protected by the completed FASs.

Table 5-6 outlines the FASs that have been completed for the SFRAs outlined in the 1st cycle FRMPs, and the number of properties protected by each. One scheme has been completed at the Newtownabbey SFRA for the Concrete Row stream and has been estimated to provide a damage benefit of approximately £2m and protection to 29 properties from fluvial flooding. Phases 1, 2 and 3 of the EBFAS in the Belfast SFRA have been completed and have been estimated to provide a damage benefit of approximately £11m and protection to 465 properties from fluvial flooding and to 1,264 properties from coastal flooding. Phase 2 of the Glenmachan Project (Greystown/Upper Malone) at the Belfast SFRA has also been completed and has been estimated to provide a damage benefit of approximately £2m and protection to 19 properties from fluvial flooding.

In addition to properties, the FRMPs assessed the potential for adverse effects from flooding on key infrastructure (i.e. WwTWs, sewage pumping stations, water treatment works, treated water pumping stations, substations and road services), either for the SFRA as a whole, or for an individual water body. It can be expected, therefore, that completion of a FAS in these locations will provide protection to any infrastructure listed.

In the Newtownabbey SFRA, the FRMP assessed the potential adverse consequences of fluvial flooding from the Concrete Row stream. Two key infrastructure assets were listed (both trunk roads), for which the completed FAS would afford protection. In the Belfast SFRA, the FRMP assessed the potential adverse consequences on key infrastructure assets from fluvial flooding as a combined measure for all water bodies considered at risk. The potential adverse consequences for all water bodies combined included 57 key infrastructure assets for a 1% AEP flood event, comprising 53 electricity substations, 3 sewage pumping stations and 1 trunk road. Completion of the flood protection measures within the EBFAS and Phase 2 of the Glenmachan Project is expected to provide protection against flooding to some of these key infrastructure assets.

The EBFAS, in conjunction with the CCG Project, connects parts of East Belfast and encourages regeneration of this area. Collaborative implementation of the EBFAS has enabled the CCG to create new material assets such as bridges, walkways, a public square and a Visitor's Centre.

The Homeowner Flood Protection Grant Scheme was introduced in 2016 as a pilot scheme designed to encourage the owners of residential properties that have flooded before and/or are located within known flood prone areas, to modify their properties in order to make them more resistant to flooding. The scheme is estimated to provide financial assistance of £960k over 3 years.

Recommendations for monitoring effects on Material Assets from implementation of the 2nd cycle FRMP 2021-2027:

- Monitor the cost benefit attributable to completed FASs;
- Monitor the number of properties protected by completed FASs;
- Monitor the infrastructure protected by completed FASs;
- Monitor the number of properties protected from future flood events by the Homeowner Flood Protection Grant Scheme, and the cost benefit attributable to this scheme.

5.8 Monitoring effects on Cultural, Architectural and Archaeological Heritage

Chapter 9 of the SEA Environmental Report for the 1st cycle FRMPs 2015-2021 proposed that monitoring of 'Cultural Heritage' could entail an assessment of any historical sites that were lost or relocated as a result of the implementation of flood risk management infrastructure, with information provided by NIEA[55] as statutory consultees for such circumstances. This would be more appropriately dealt with at project (EIA) level. Should any structural approaches be identified for SFRAs, the proposals and approaches will be required to undergo assessment through the Drainage (Environmental Impact Assessment) Regulations (Northern Ireland) 2006, which will ensure that any approaches implemented have been agreed through consultation with DfC as a statutory consultee.

At a strategic level, Section 7 of the Northern Ireland Environmental Statistics Report 2019 examines the numbers of scheduled monuments and listed buildings in Northern Ireland, including those which are at risk. An online database 'Heritage at Risk Register for Northern Ireland (HARNI)' indicates properties of architectural or historic merit throughout the country that are considered to be at risk or under threat. A listed building or structure is considered to be at risk when its condition and management is deemed poor and unsustainable, and under threat of deterioration or demolition. The HARNI register gives an indication of changes in the number of buildings and structures at risk. There were 512 buildings and structures listed in 2017/18, an increase of 12 from 2016/17.

The potential for positive impacts of the FRMP on cultural heritage should also be monitored, as FASs can provide protection to heritage sites or features. The FRMPs assessed the potential for adverse effects from flooding on heritage sites, either for the SFRA as a whole, or for an individual

[55] Responsibility now lies with the Department for Communities (DfC)

water body. It can be expected, therefore, that completion of a FAS in this location will provide protection to any heritage features or sites identified in the FRMP. In the Newtownabbey SFRA, the FRMP assessed the potential adverse consequences of fluvial flooding from the Concrete Row stream. No built heritage sites were listed, for which the completed FAS would afford protection. In the Belfast SFRA, the FRMP assessed the potential adverse consequences on built heritage sites from both fluvial and coastal flooding as a combined measure for all water bodies considered at risk. For fluvial flooding, the potential adverse consequences for all water bodies combined included 8 built heritage sites for a 1% AEP flood event, comprising 7 listed buildings and 1 site and monument record. Completion of the flood protection measures within the EBFAS and Phase 2 of the Glenmachan Project is expected to provide protection against flooding to some of these built heritage sites.

The EBFAS was planned and implemented in conjunction with the CCG Project. While the benefits arising from completion of the CCG Project cannot be directly attributed to the EBFAS, this collaborative arrangement enabled the flood alleviation works to facilitate the development of the CCG Project, a linear walk following the courses of the Connswater, Knock and Loop rivers, and linking together parts of East Belfast. This has enabled the creation of new cultural heritage assets, such as leisure and heritage trails, the C.S. Lewis Public Square, sculptures and the EastSide Visitors Centre.

Recommendations for monitoring effects on Cultural Heritage from implementation of the 2nd cycle FRMP 2021-2027:

- It is recommended that monitoring for adverse effects on scheduled monuments, industrial heritage assets, maritime heritage assets and listed buildings is dealt with at project level. Under the Historic Monuments and Archaeological Objects (Northern Ireland) Order 1995, a Scheduled Monument Consent must be sought from the Historic Environment Division (HED)[56] of DfC for any proposed works which may alter or disturb the fabric of a scheduled historic monument or its ground surface.
- The full suite of heritage assets, as available from the Historic Environment Record should be considered for any projects arising from the FRMP. Comprehensive historic environment datasets held by HED should be used to assess and monitor the effects of implementing the 2nd cycle FRMP on cultural heritage features, including the potential for adverse impacts on the setting of sites in addition to direct effects, as outlined in HED's Guidance on Setting and the Historic Environment 2018[57].
- The detailed flood risk mapping undertaken in development of the 2nd cycle FRMP will provide details of any built heritage sites at risk from flooding. This can be used to monitor the number of built heritage sites or features afforded protection by completed FASs.
- Monitor where heritage assets are used as part of the means to address flood risk – i.e. through historic coastal works, or man-made waterways and historic canals.

[56] https://www.communities-ni.gov.uk/publications/historic-environment-digital-datasets

[57] https://www.communities-ni.gov.uk/sites/default/files/publications/communities/guidance-on-setting-and-the-historic-environment.pdf

5.9 Monitoring effects on Landscape and Visual Amenity

Chapter 9 of the SEA Environmental Report for the 1st cycle FRMPs 2015-2021 proposed that the endorsement of the use of Sustainable Drainage Systems (SuDS) in the development of future legislation should include the necessary formal monitoring arrangements.

Since the development of the 1st cycle FRMPs, new legislation has been introduced, 'The Water and Sewerage Services Act (Northern Ireland) 2016'. This Act requires that any person proposing to connect a sewer or lateral drain to a public sewer obtain written approval on the basis of a mandatory sewer adoption agreement. The Planning, Advisory and Modelling Unit (PAMU) of DfI is providing input to the Storm Water Management Group in dealing with the emerging Sustainable Drainage Systems policy for Northern Ireland. In addition, the Living with Water Programme (LWWP) is developing a Strategic Drainage Infrastructure Programme (SDIP) which includes the Belfast SFRA. Development of the SDIP is ongoing (Table 5 4), and the aim is for any construction works arising from the Plan to be undertaken by 2026, where viable.

Further to the above assessment of SuDS, and in order to enable more relevant and measurable monitoring within the FRMP cycle, the capacity of completed FASs to protect, maintain and, where possible enhance local landscapes could be assessed. This may only be a feasible monitoring measure for larger projects, those that include the creation of upstream storage, or those where flood alleviation works have been integrated with other landscape regeneration projects. The EBFAS, in conjunction with the CCG Project, enabled the creation of a 9km linear park through east Belfast, following the course of the Connswater, Knock and Loop Rivers. This blue-green infrastructure has created parkland for leisure, recreation, community events and activities, and allows residents to travel across the city on foot or by bicycle via the 16km of cycle and walkways.

At a strategic level, changes to LCAs, RCAs or RSCAs could be used to monitor any significant changes in landscape or seascape character from implementation of FASs.

Recommendations for monitoring effects on Landscape from implementation of the 2nd cycle FRMP 2021-2027:

- Assess the area of blue/green infrastructure created during implementation of completed FASs (likely only feasible for larger projects, those that include the creation of upstream storage, or those where flood alleviation works have been integrated with other landscape regeneration projects);
- Assess any significant changes to landscape or seascape character from implementation of FASs.

6 Monitoring Conclusions and Recommendations

Monitoring of the implementation of the 1st cycle NI FRMPs has not found any significant negative impacts on the wider environment, based on the SEA topics and indicators. This monitoring has however found localised, significant positive impacts on population, human health and material assets, from the protection of people and property from flood risk in the Newtownabbey and Belfast SFRAs.

The 2nd cycle NI FRMP will cover the period from 2021-2027. Monitoring of the SEA topics detailed previously will be required from implementation of FASs during the 2nd cycle FRMP in the identified areas of potential significant flood risk (APSFR). Chapter 9 of the SEA Environmental Report for the 1st cycle FRMPs proposed a set of generic measures to be used for monitoring of SEA topics (**Table 5-1**). This assessment has provided an insight into how appropriate the generic measures and indicators that were proposed in the SEA Environmental Report are for monitoring purposes. The recommended strategy (measures, indicators and data sources) for monitoring effects from implementation of the 2nd cycle FRMPS 2021-2027 is outlined in **Table 6-1**. For some SEA topics, the proposed measures and data sources remain the same as those that were proposed for the 1st cycle plans (i.e. **Table 5-1**), where this assessment has found them to be suitable; these have been refined, where possible, with the addition of proposed indicator(s). For other SEA topics, alternative measures, associated indicators, and data sources have been proposed that are considered to be more appropriate.

Table 6-1: Proposed monitoring measures, indicators and data sources for SEA topics for the 2nd cycle FRMP 2021-2027

SEA Topic	Proposed Measures	Proposed Indicator(s)	Proposed Data Source(s)
Biodiversity, Flora and Fauna	Protected sites and species are monitored with regards to their conservation objectives. Any increase in unfavourable/ favourable conditions for protected and priority species and their habitats will be monitored in conjunction with the implementation of flood risk management projects as well as any habitat loss/increase.	• Change in condition of designated national or European designated sites; • Significant changes in existing protected and priority species and habitats.	• DAERA National Site Network reporting (every 6 years) for European sites relevant to completed/in progress FASs; • Article 17 Habitats Directive reporting and Article 12 Birds Directive reporting for the Republic of Ireland, relevant to completed/in progress FASs that have potential for trans-boundary effects. NPWS website and data request portal for provision of relevant data for trans-boundary habitats and species that are likely to be affected by downstream projects. • Consultation with DAERA regarding any significant changes in the condition of habitats/species within ASSIs relevant to completed/in progress FASs from site Condition Assessments; • DfI data on completed FASs, • Monitoring undertaken by DAERA Marine and Fisheries Division under the Marine Strategy.
Cultural Heritage	Historical sites (monuments, listed buildings, industrial heritage, maritime heritage, archaeological sites, etc.) should be appropriately monitored where they are lost, damaged, relocated or discovered as a result of FASs.	• Number of cultural heritage (including marine) sites or features that have been afforded protection by completed FASs; • Number of historical sites (including marine) that have been lost, damaged, relocated, or discovered during FASs. • Number and state of heritage assets used as part of the means to address flood risk – i.e. through historic coastal works, or man-made waterways and historic canals.	• Project-specific information on the sites or features at risk from flooding that will be protected by completed FASs; • Project-specific information from DfI or via consultation with DfC regarding the loss, damage, relocation or discovery of any historical sites during completed/in progress FASs.

SEA Topic	Proposed Measures	Proposed Indicator(s)	Proposed Data Source(s)
Water	Water quality is monitored by DAERA under the requirements of the WFD and Marine Strategy. Any changes in status of water bodies will be monitored in conjunction with the implementation of flood risk management projects.	• Change in WFD status of water bodies; • Change in the status of Quality Descriptors under the MS.	• WFD reporting of water body status by DAERA; • Monitoring undertaken by DAERA Marine and Fisheries Division under the Marine Strategy.
Geology and Soil	The condition and quality of designated sites of geological importance (ASSIs) is subject to ongoing monitoring. This should be reviewed in conjunction with the implementation of flood risk management projects.	• Change in condition of ASSI sites designated for geological features.	• Consultation with DAERA regarding any significant changes in the condition of ASSIs designated for geological features relevant to completed/in progress FASs.
Population and Human Health	The implementation of Flood Risk Management measures directly protects the population of these areas against flooding, and the number of individuals directly protected can be monitored, as well as the cost benefit attributable to the FASs.	• Number of people protected by completed FASs; • Areas of blue/green infrastructure that provide potential for health / living environment benefits have been created.	• DfI data on completed FASs, providing information on the no. of properties protected and areas of blue/green infrastructure created; • NI Census population statistics on average household size in the scheme areas.
Material Assets	Benefits from implemented flood risk management measures should be monitored, including cost benefits, no. of properties protected and any infrastructure protected by schemes.	• Cost benefit attributable to completed FASs; • Number of properties protected by completed FASs; • Infrastructure protected by completed FASs. • Monitor the number of properties protected from future flood events by the Homeowner Flood Protection Grant Scheme, and the cost benefit attributable to this scheme.	• DfI data on completed FASs.

SEA Topic	Proposed Measures	Proposed Indicator(s)	Proposed Data Source(s)
Climate Factors	The effects of climate change should be effectively managed through the implementation of Flood relief management measures. The capacity of implemented schemes to manage climate change effects can be monitored.	• Number of completed FASs that have been designed to be adaptable to climate change projections; • Number of people protected against the effects of climate change by completed FASs.	• DfI data on completed FASs.
Landscape	Flood management measures should be designed to protect, maintain and enhance both visual amenity and landscape/ seascape character of local landscapes. Monitoring can assess the amount of blue/ green infrastructure created during the implementation of completed schemes, and any changes in visual amenity and/or landscape/ seascape character following implementation of FASs.	• Area of blue/green infrastructure (including surface SuDS) created during implementation of completed FASs; • Any changes to visual amenity and/ or the landscape/ seascape character from implementation of FASs.	• DfI data on completed FASs; • DfI data on areas of blue-green infrastructure created as part of completed FASs; • Landscape and seascape character assessments for NI; • Local Development Plans.

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