

Appendix C **Baseline Environment**

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C.1 Water Environment

C.1.1 Water Legislation and Governance

The European Union (EU) Water Framework Directive (2000/60/EC) establishes a framework for the protection of surface water and groundwater. Under the Water Framework Directive (WFD), Ireland has committed to ensuring that all waterbodies in Ireland achieve 'Good' status by 2027. The key objectives of the WFD are to prevent deterioration and enhance status of aquatic ecosystems, including groundwater. Therefore, under the WFD, any modification to a waterbody should not lead to the deterioration of the overall status or any of the WFD water quality parameters.

All Shellfish Water Protected Areas (SWPAs) must be managed to ensure that they meet their ecological and chemical objectives and meet at least Class B status under the EU Hygiene Regulations to meet the requirements of the WFD.

The River Basin Management Plan (RBMP) for Ireland sets out how organisations, stakeholders and communities will collaborate to improve the water environment and meet the requirements of the WFD. The RBMP is updated every 6 years as part of the river basin planning cycle and sets out the objectives, targets and measures to improve waterbodies throughout Ireland to improve water quality and achieve "Good" ecological status in waterbodies (rivers, lakes, estuaries and coastal waters) by 2027. The RBMP is currently in its second cycle, introducing new initiatives and policies that built on those proposed in the first cycle and aiming to implement support measures for high priority areas.

The third cycle draft RBMP has undergone consultation and the third cycle RBMP is currently being prepared by the Department of Housing, Local Government and Heritage (DHLGH). The draft RBMP identified significant pressures in waterbodies in relation to hydromorphology, land use planning, agriculture, siltation and hazardous chemicals.

The Marine Strategy Framework Directive (2008/56/EC) aims to protect the marine environment more effectively across Europe and achieve good environmental status in marine and, particularly in, coastal waters.

At the end of 2022, the government passed the Water Environment (Abstractions and Associated Impoundments) Act, 2022 (the Abstractions Act), which will ensure that national abstractions align with the requirements of the WFD. The Abstractions Act has not yet commenced and the associated regulations and guidelines which will further detail the types of assessment and national methodology to be used are not yet published or in place.

The EU Floods Directive (2007/60/EC) required member states to develop Flood Risk Management Plans for areas of existing and future potentially significant flood risk. The Floods Directive was transposed into Irish law by the EU (Assessment and Management of Flood Risks) Regulations 2010 and sets out the responsibilities of the Office of Public Works (OPW).

The OPW has mainly been implementing the Directive through the Catchment-based Flood Risk Assessment and Management (CFRAM) Programme (OPW, 2018)³, through which 29 draft Flood Risk Management Plans have been developed.

C.1.2 Water Environment Baseline Condition

Ireland's water resources are a vital natural asset. The surface water resource is comprised of 84,800 km of mapped river channel, 12,000 lakes, hundreds of estuaries and over 14,000 km² of coastal waters. Relative to

³ OPW. 2018. *Catchment Flood Risk Assessment and Management Programme*. Accessed: 06.01.23. Available from: <https://www.floodinfo.ie/map/floodplans>

other European countries, Ireland has twice the EU average of lake coverage (12,000 lakes covering ~2% land area) (EPA, 2023b)⁴. The surface waterbodies within the 40 WFD catchments are shown in Figure C.1.

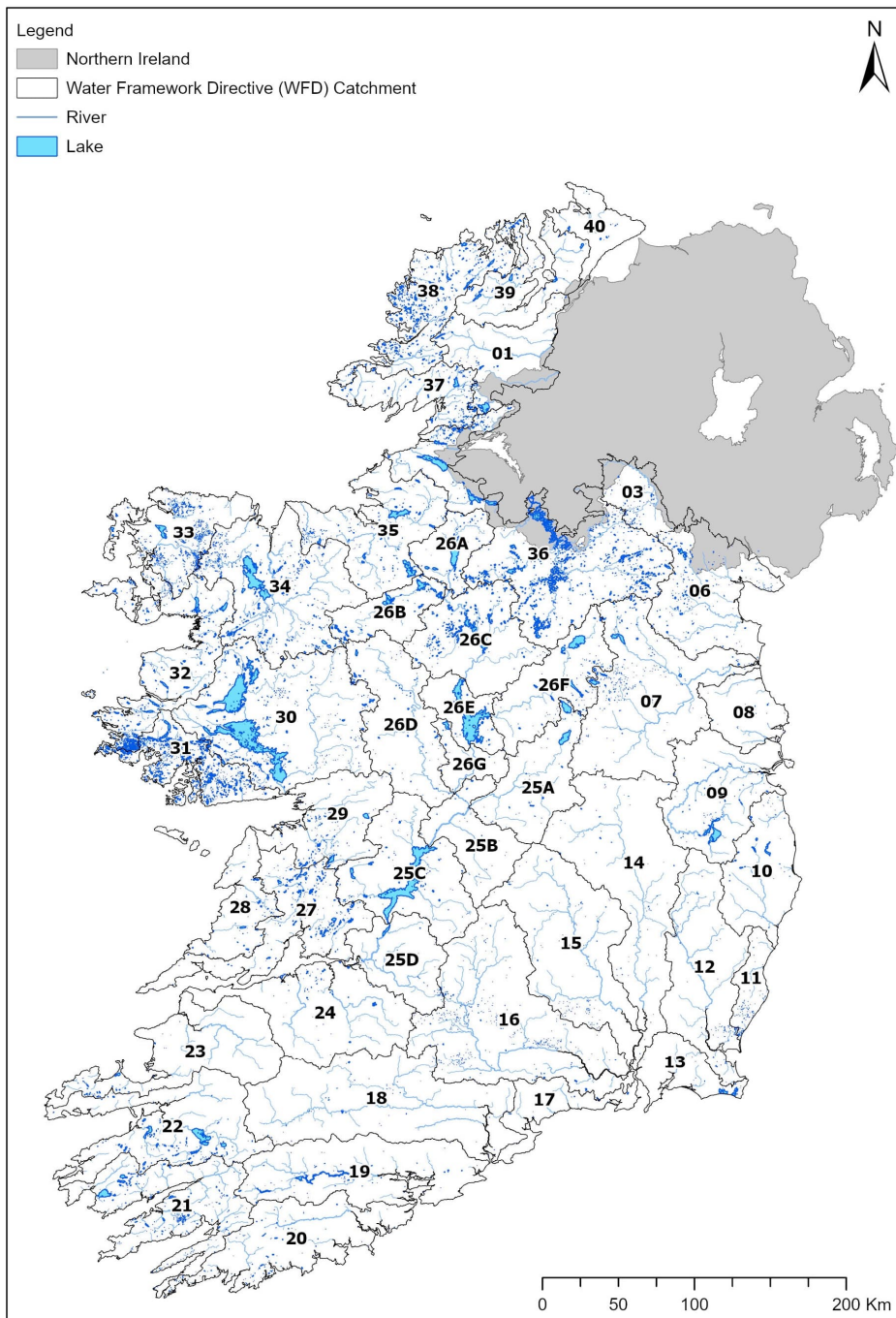


Figure C.1 Surface waterbodies and catchments within Ireland (EPA, 2022d)⁵

Water Quality

Ireland has seen a continuing decline in high status waterbodies and an increase in the number of waterbodies in poor ecological health. Even more stark is the dramatic reduction in the number of the most pristine rivers, which have fallen in 30 years from over 500 sites in 1990 to only 20 sites in 2020. The EPA urge

⁴ EPA. 2023b. *Ireland's environment*. Accessed 27.07.2023. Available from: <https://www.epa.ie/our-services/monitoring--assessment/assessment/irelands-environment/>

⁵ EPA. 2022d. *Catchments*. Accessed 01.08.2023. Available from: <https://gis.epa.ie/GetData/Download>

that focus should be given to protecting estuaries, as these waterbodies have the worst status overall and specific measures for their improvement and protection are needed (EPA, 2020a). The most recent water quality assessment cycle (2016-2021) reports that the number of estuaries and coastal waters in satisfactory condition has declined by almost 16% and 10% respectively (EPA, 2023c).

A summary of the EPA's WFD status (2023d) and WFD risk (2023e) datasets for all waterbodies in Ireland are provided in Figure C.3, Figure C.5, Figure C.8, Figure C.9 and Figure C.6. The assessment shows that 54% of surface waters are in good or better ecological condition and 46% are in unsatisfactory condition; approximately 9% of groundwater bodies are in poor condition and 91% are in good condition.

There has also been a 1% decline of monitored rivers and a 3% decline of monitored lakes in satisfactory condition. However, according to the EPA's water quality indicators report (2023c), there has been no significant change in the biological quality of Ireland's rivers and lakes in 2022, with any improvements being offset by declines elsewhere.

The water quality reported in the summary report for Ireland's water quality (EPA, 2022b) demonstrates that there has been a general pattern of decline in satisfactory water quality in Ireland's surface waters since the first assessment of ecological status was undertaken in the period 2007-2009. This report also identified that 88% of surface waterbodies achieved good chemical status when ubiquitous substances were excluded (for example mercury and polycyclic aromatic hydrocarbons (PAHs)).

In total, 1,629 waterbodies in Ireland are assessed as being 'At Risk' of not meeting their environmental objectives). Rivers account for approximately 81% of the 'At risk' waterbodies, followed by lakes (9%), groundwater (5%), transitional (3%) and coastal (1%) waterbodies (EPA, 2023e). The main significant pressures impacting on waterbodies that are 'At Risk' according to the EPA (2023g)⁶ are agriculture, hydromorphology, forestry, and urban waste water discharges.

Rivers

Just over half of the 3,208 river waterbodies assessed nationally are in satisfactory ecological health being in either good or high status. The remaining waterbodies are of moderate, poor or bad ecological status (Figure C.3). There has been a 1% decline in the satisfactory condition of river waterbodies since the 2013-2018 period (EPA, 2022b).

There were 319 river waterbodies designated with a high-status objective in the 2018-2021 period, only 137 (43%) were meeting the objective by 2021 (EPA, 2022b). Currently there are 257 high status rivers in Ireland, meaning 81% are now meeting the 2018-2021 objective. Figure C.2 presents the distribution of the ecological status of rivers in Ireland.

⁶ EPA. 2023g. *Ireland's National Water Quality Monitoring Programme 2022-2027*. Accessed: 02.11.2023. Available from: https://www.epa.ie/publications/monitoring--assessment/freshwater--marine/EPA_WFD_MonitoringProgramme_2022_2027.pdf

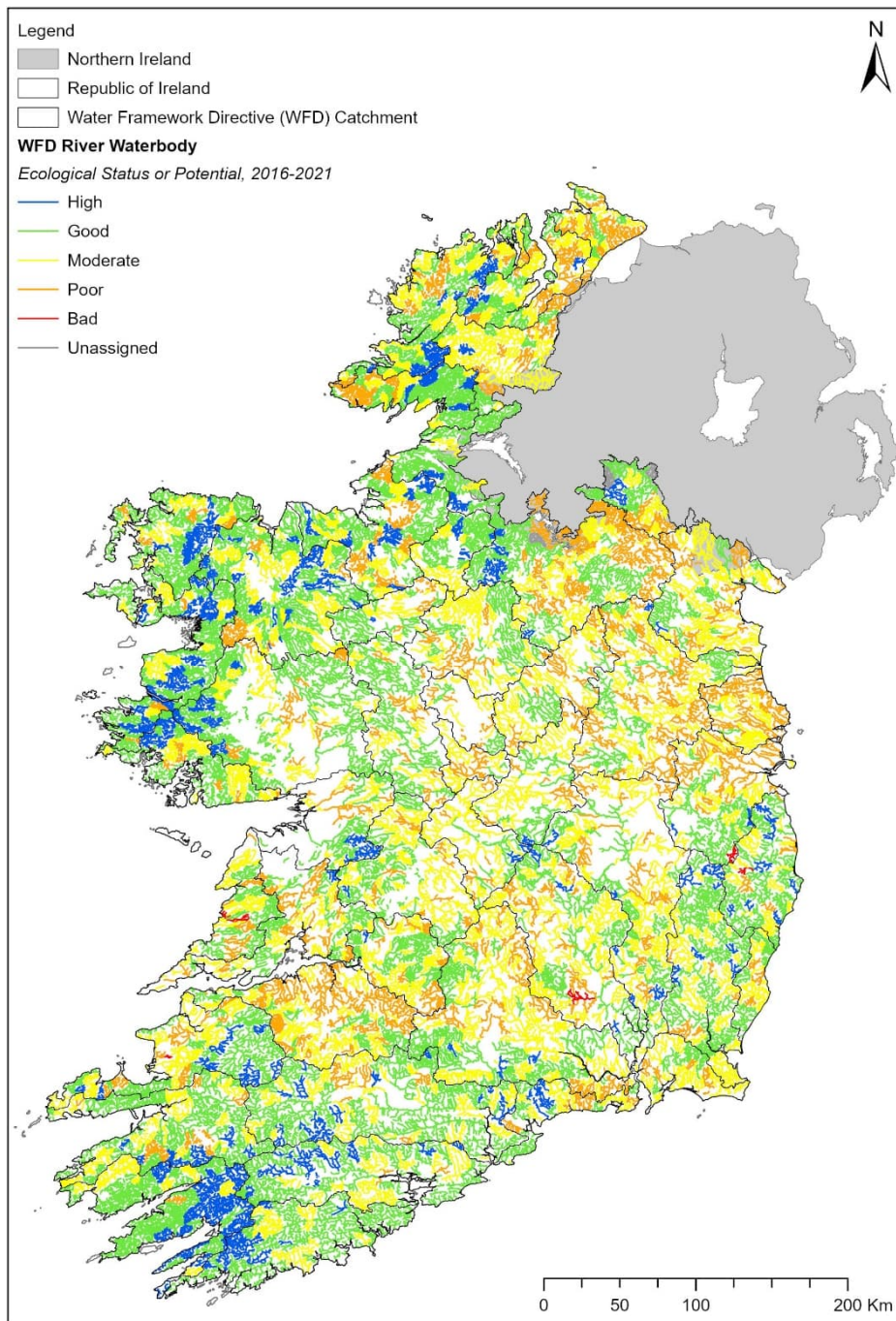


Figure C.2 WFD ecological status of rivers in Ireland 2016 – 2021 (EPA, 2023f)⁷

The catchments with the lowest percentage of monitored satisfactory river waterbodies are located mainly in the North West, East, South East and Midlands regions. The Munster Blackwater, Nore and Suir catchments in the south and southeast have the highest number of declines in status (EPA, 2022b).

Concentrations of nitrogen have been increasing in the South East, Midlands and Eastern regions since 2012. However, there has been an increase in river nitrate concentrations across all of the regions in Ireland between 2021-2022 primarily as a consequence of agricultural fertilisers and waste water discharges. The South East region has the highest nitrate concentrations of the regions, and the annual average concentrations are likely to have a negative impact on estuaries and coastal water quality (EPA, 2023c).

⁷ EPA. 2023f. *WFD Status Geodatabase (All Waterbodies) 2016-2021 - May 2023*. Accessed: 01.08.2023. Available from: <https://gis.epa.ie/GetData/Download>

Although there has been some fluctuation, phosphate levels have been fairly stable in recent years. The South East and South West regions have the highest river phosphate concentrations, and the 2020-2022 data shows that 28% of river sites have unsatisfactory phosphate levels in Ireland (EPA, 2023c).

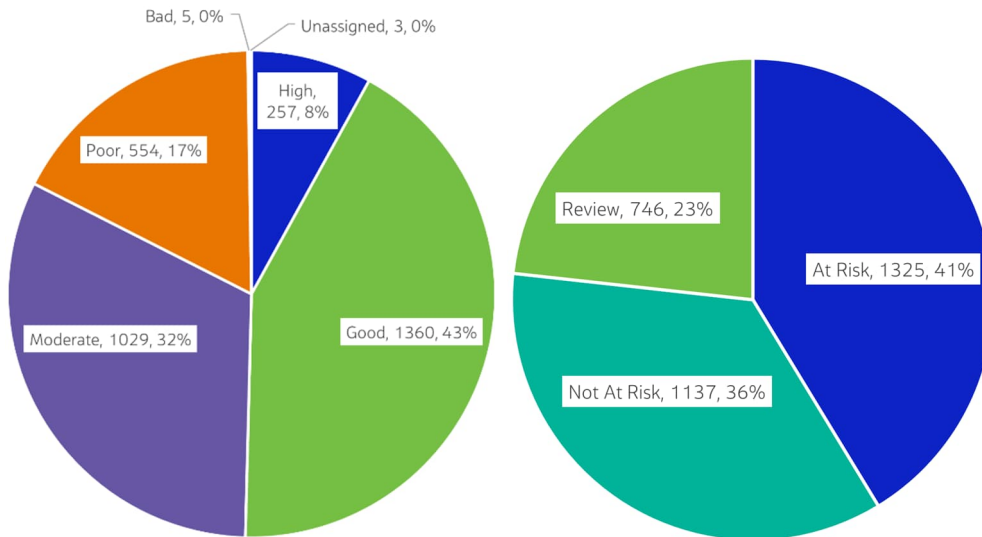


Figure C.3 WFD status and WFD risk of river waterbodies in Ireland (EPA, 2023d and 2023e)

Lakes

Nationally, 557 lakes (69%) are in good or better ecological health and the remaining lakes (32%) are in unsatisfactory condition (Figure C.5). According to the EPA Water Quality Indicator Report (2023c) there has been a 1% decline in the satisfactory (high or good) biological quality of lakes between the 2019-2021 and 2020-2022 assessments. However, there has also been a 2% decrease in the number of lakes assessed as having poor or bad biological quality.

The majority of high and good ecological status lakes are found in the West and South West of Ireland (EPA, 2023c) (see Figure C.4) while the majority of moderate or worse ecological status lakes are located in the Border region. This distribution tends to reflect the difference in the level of human activity, hydrogeology and soil conditions in these regions. Lakes in the northeast of the country have the highest total phosphorus concentrations and show rising trends. Restoring these lakes to at least good status by 2027 represents a significant challenge as they often contain a historical legacy store of phosphorus in their sediments that is slowly being released over time (EPA, 2022b).

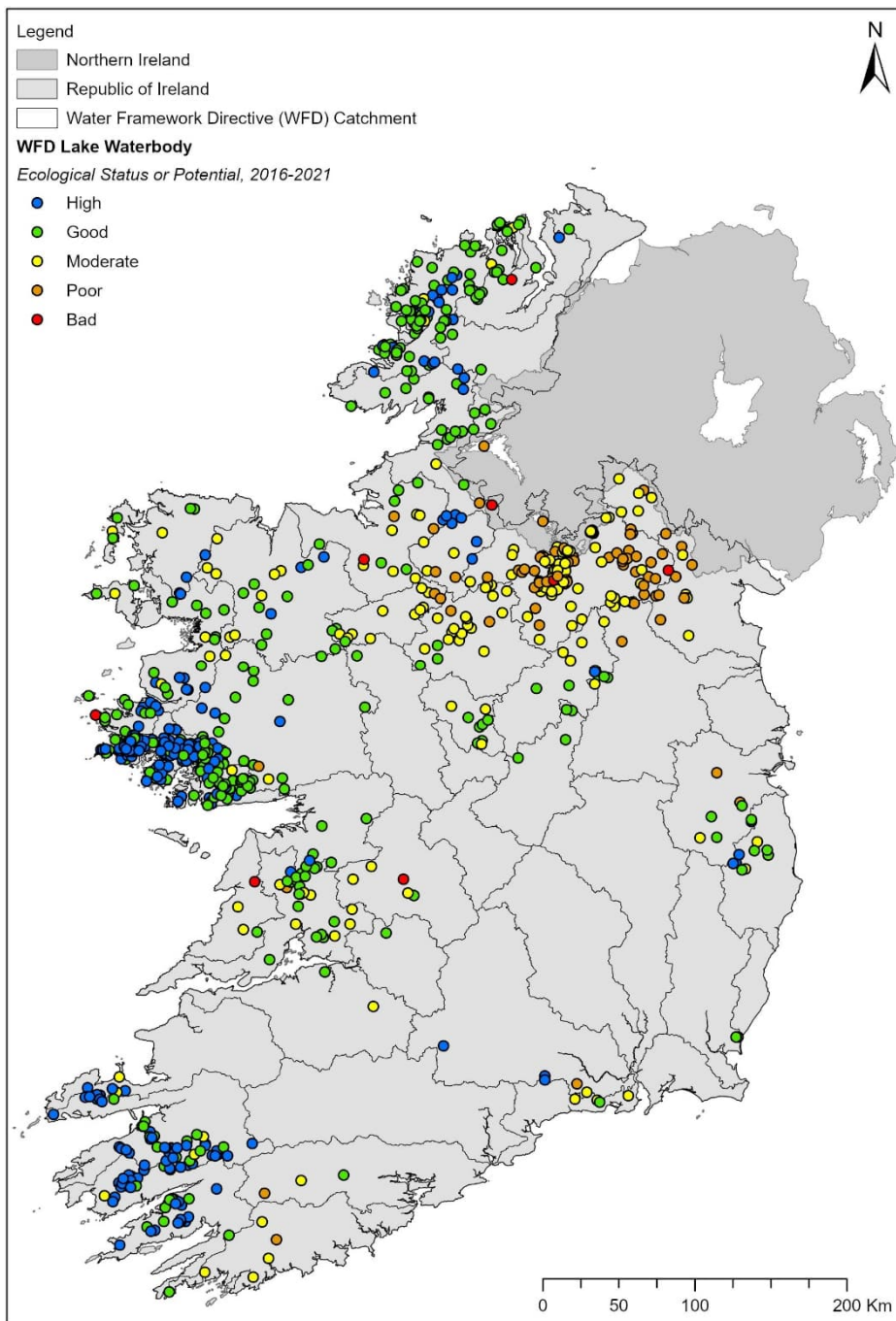


Figure C.4 WFD ecological status of lakes in Ireland, 2016 – 2021 (EPA, 2023f)

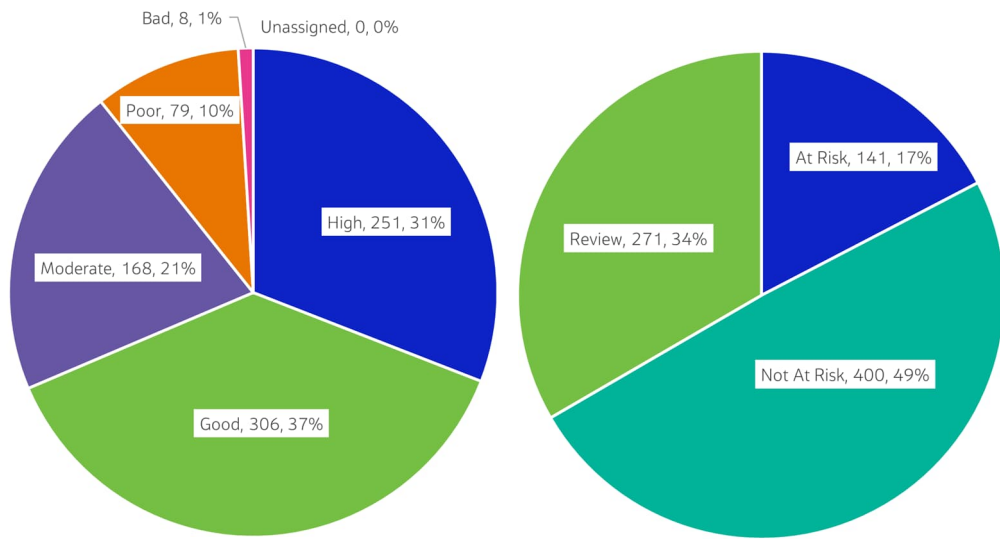


Figure C.5 WFD status and WFD risk of lake waterbodies in Ireland (EPA, 2023d and 2023e)

Groundwater

The majority (91%) of the groundwaters are in a satisfactory condition (Figure C.6). Groundwaters in the South East, Eastern and Midlands, and South West regions of the country have elevated nitrate concentrations with the increasing nitrate concentration being most notable in the South East and Eastern and Midlands regions (EPA, 2023c) (Figure C.7). . There are localised issues in the groundwaters with elevated nutrients and chemical substances affecting an increased number of drinking waters. In addition to this, chemical pollution related to historical mining, industrial and waste sites, still persists in some areas (EPA, 2022b).

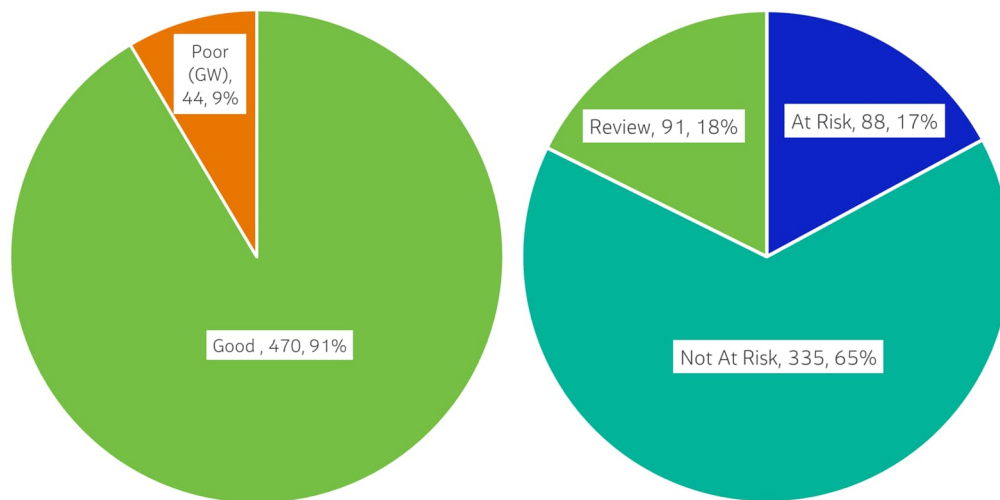


Figure C.6 WFD status and WFD risk of groundwater bodies in Ireland (EPA, 2023d and 2023e)

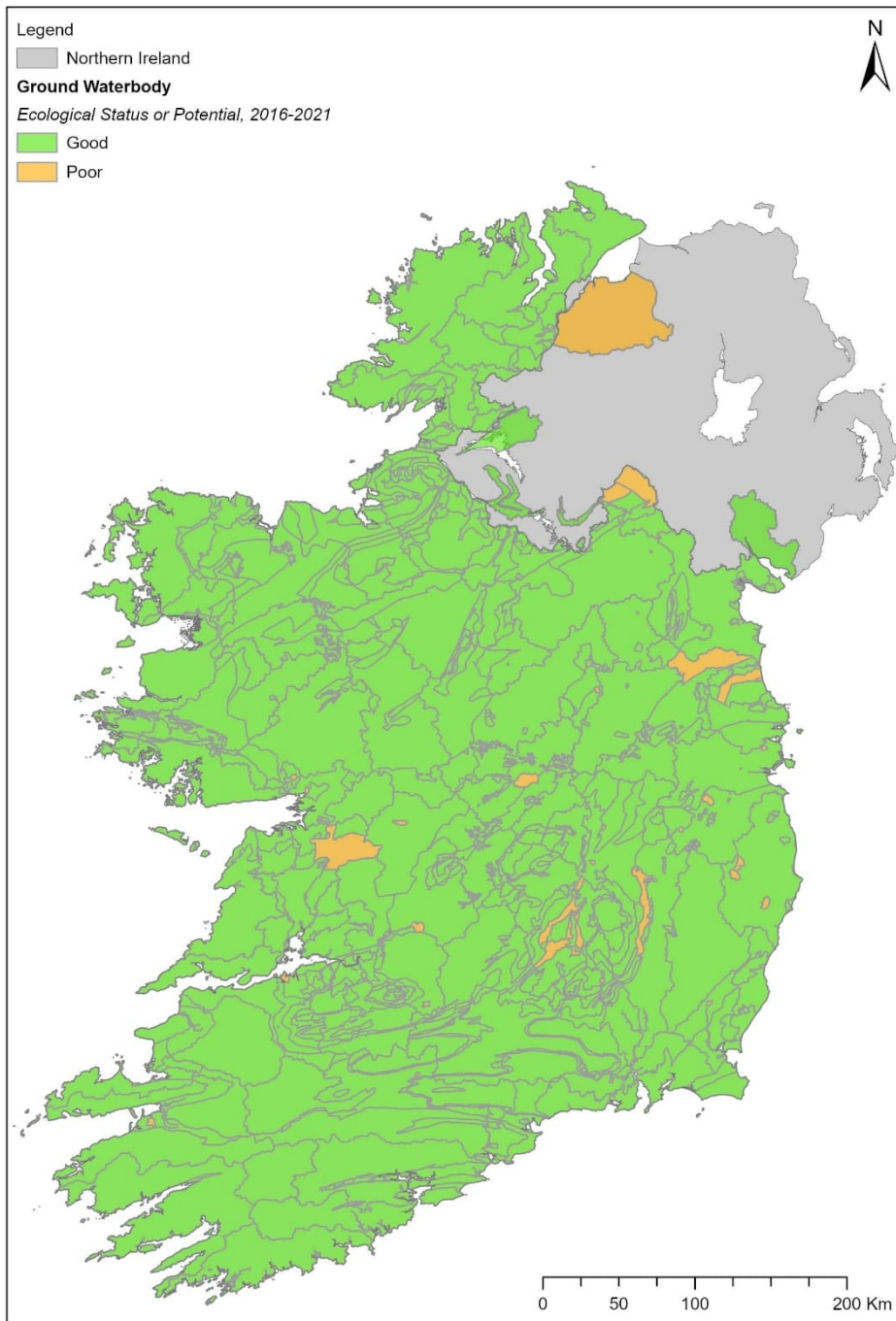


Figure C.7 WFD ecological status of groundwaters in Ireland, 2016-2021 (EPA, 2023f)

Transitional (Estuarine) and Coastal Waters

A total of 28% of transitional waterbodies (Figure C.8) and 71% of coastal waters (Figure C.9) are assessed as being of high or good ecological status. Transitional and coastal waters have seen a significant decline in status in the EPA’s 2016 to 2021 assessment (EPA, 2022b). The increase in nutrient inputs to the marine environment are likely a strong driver of these declines. Most of the increases in nutrient inputs have been recorded in the south and southeast of the country (. This continued pressure is being seen to have impacts on the biology of both the estuarine and coastal waters.

The EPA highlights that since the last assessment published in 2019 the number of monitored water bodies in satisfactory condition has declined by 16% in estuaries, and 10% percent in coastal waters, significantly more than for freshwater rivers and lakes (EPA, 2022b).

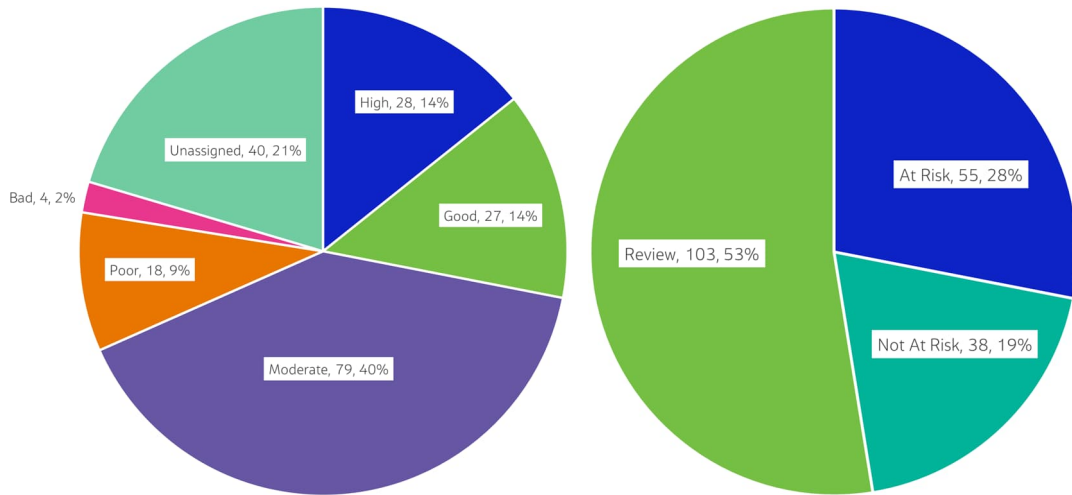


Figure C.8 WFD status and WFD risk of transitional waterbodies in Ireland (EPA, 2023d and 2023e)

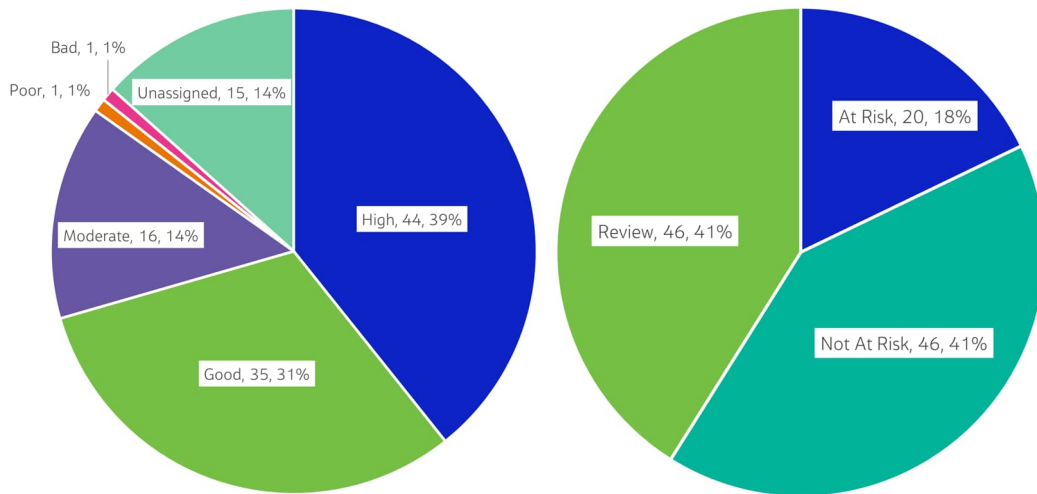


Figure C.9 WFD status and WFD risk of coastal waterbodies in Ireland (EPA, 2023d and 2023e)

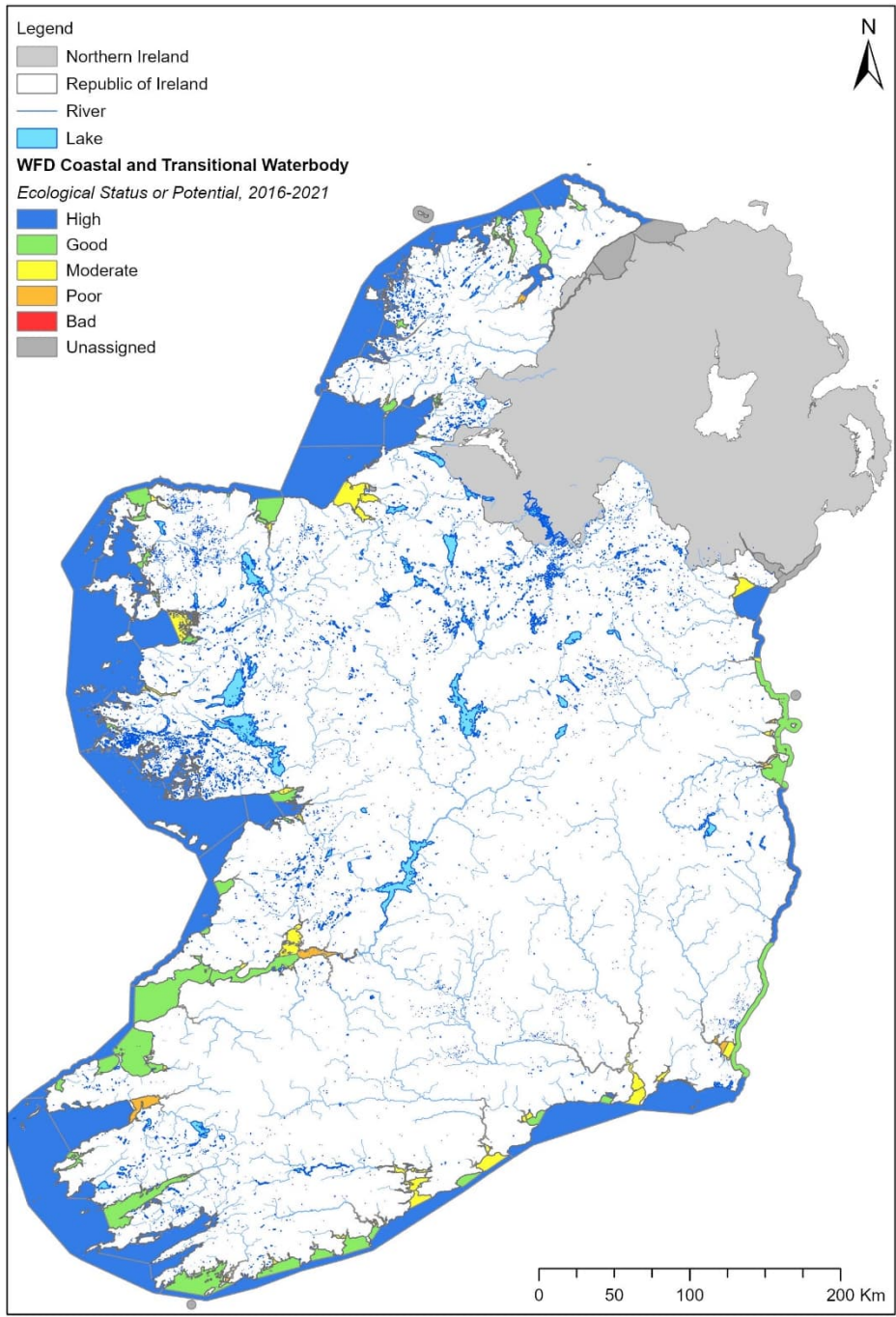


Figure C.10 WFD ecological status of transitional and coastal waterbodies, 2016-2021 (EPA, 2023f)

Marine Environment

The temperate waters that surround Ireland are highly productive and provide a rich mosaic of marine life. The assessment of the wider marine areas is covered under the EU Marine Strategy Framework Directive.

Ireland’s location in the Atlantic Ocean on the edge of the European continent has meant that its marine environment has remained relatively unpolluted (Figure C.10). In recent years, however, the level of environmental stress, from both internal and external sources, has increased. Coastal development, particularly during the 1990s, has resulted in an increase in the range and magnitude of pressures that have the potential to impact negatively on the quality of Ireland’s tidal waters.

Bathing Waters

Bathing waters, including their beaches, are monitored and managed by the local authorities. The classification of bathing water quality relates only to the bathing season.

There are currently 148 identified bathing waters that are monitored and managed under the Bathing Water Regulations in Ireland. A newly identified bathing water (Aillebrack/Silverhill Beach Galway) will be categorised after 2023 when the required number of samples for the assessment have been taken (EPA, 2023h)⁸.

Overall, bathing water quality has continued to improve in 2022 (Figure C.11). Of the 148 identified bathing waters assessed, 144 (97%) met or exceeded the minimum required standard of sufficient, with 79% reaching an excellent rating. One bathing water (Lilliput, Lough Ennell, Westmeath) was classified as good for 2022 after it had been poor for some time (EPA, 2023h).

In 2022, 34 bathing water pollution incidents resulting in beach closures were reported to the EPA, compared to 42 in 2021. The local authorities take a precautionary approach when managing incidents, meaning that not all incidents result in a deterioration in the bathing water quality. This approach is taken to protect bathers' health (EPA, 2023h). Urban wastewater was the most frequent cause of pollution incidents contributing to 38% in 2022.

Three bathing waters were classified as poor in 2022, Balbriggan, Front Strand Beach, Lady's Bay, Buncrana, and Trá na mBan, An Spidéal (EPA, 2023h). One more than in 2021. The local authorities with poor bathing waters have management plans in place to address the issues.

⁸ EPA. 2023h. *Bathing Water Quality in Ireland A report for the year 2022*. Accessed: 03.09.2023. Available from: <https://www.epa.ie/publications/monitoring--assessment/freshwater--marine/Bathing-Water-Quality-in-Ireland-2022.pdf>

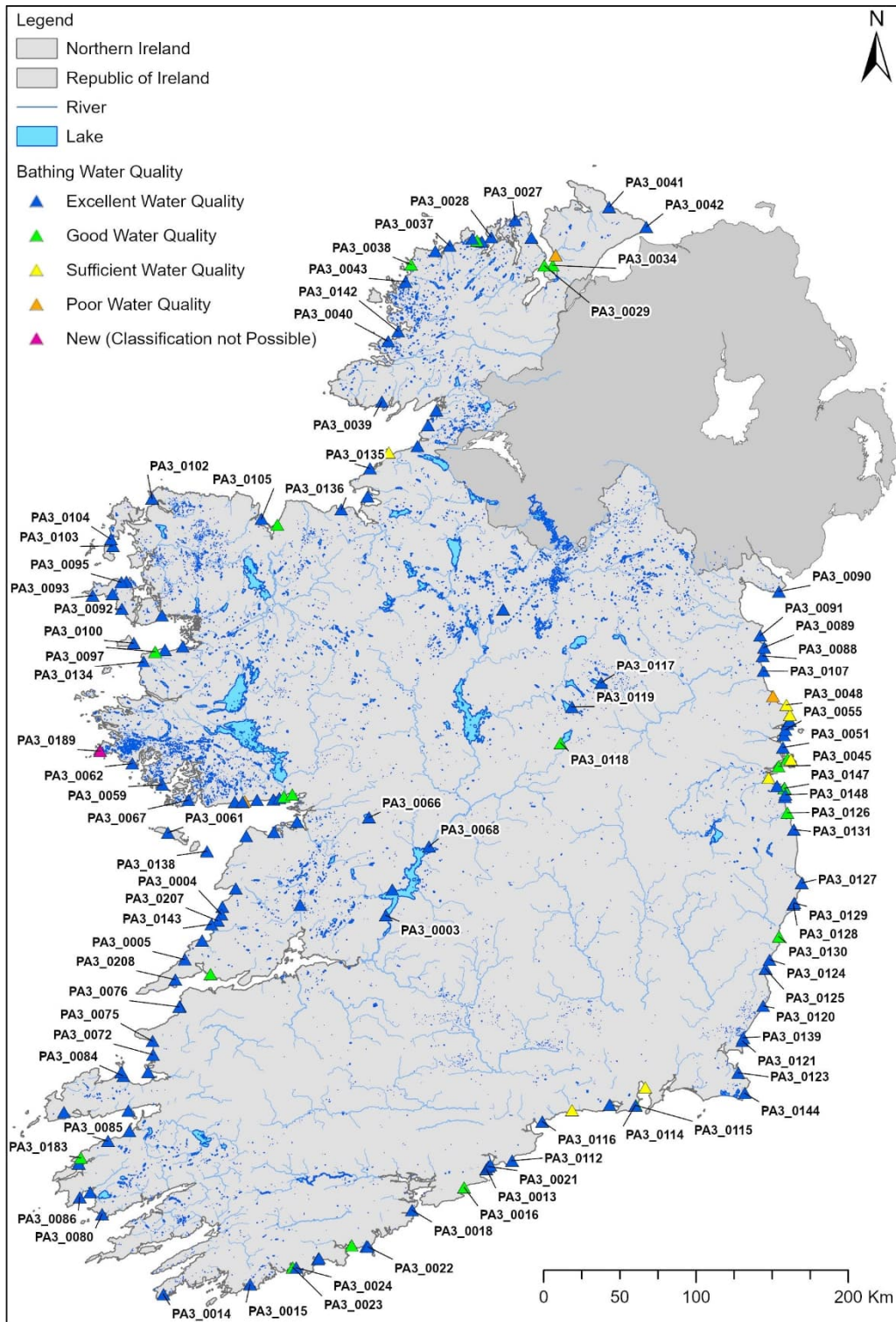


Figure C.11 Bathing water quality map of Ireland 2022 (EPA, 2023i)⁹

Sources of Pollution

The EPA 2016-2021 water quality assessments (EPA, 2022b) identify that the main pressures on water quality are primarily from agriculture, followed by physical changes such as land drainage and dredging, then forestry activities and discharges from urban wastewater. These activities lead to run-off of nutrients,

⁹ EPA. 2023i. *Bathing water locations and compliance*. Accessed: 01.08.2023. Available from: <https://gis.epa.ie/GetData/Download>

sediment and pesticides and damage to the physical habitat of waterbodies with associated impacts on aquatic ecosystems.

The number of waterbodies impacted by urban wastewater remains high, but it is clearly reducing with expected further reductions in the number affected. In contrast, the number of waterbodies impacted by agriculture has been increasing.

C.1.3 Flood Risk

Flooding has become a greater issue in Ireland in recent years. The frequency of flood events has been increasing and, with climate change, is expected to increase further. Increased flooding can cause pressure on drains and sewers and can affect surface water quality through impacts to wastewater treatment plant operation and the release of untreated stormwaters due to flood events. Flood events also increase nutrient rich sediment run off from agricultural and forestry land which affects water quality. Figure C.12 presents medium and high probability flood risk for surface water and groundwater.

The Floods Directive (2007/60/EC) required member states to develop Flood Risk Management Plans for areas of existing and future potentially significant flood risk. The Floods Directive was transposed into Irish law by the EU (Assessment and Management of Flood Risks) Regulations 2010 and sets out the responsibilities of the OPW.

The OPW has been implementing the Directive mainly through the Catchment-based Flood Risk Assessment and Management (CFRAM) Programme (OPW, 2018)¹⁰, through which 29 draft Flood Risk Management Plans have been developed. Approximately 300 Areas for Further Assessment have been established along with a range of measures to reduce or manage the flood risk within each catchment.

CFRAM mapping for all Areas for Further Assessment is available to view on the CFRAM website (OPW, 2018). An increase in likelihood of river and coastal flooding is predicted across Ireland from Climate Change projections. All of Ireland's major cities are located in coastal areas subject to tides, and a significant rise in sea levels will have major economic, social and environmental impacts.

The includes flood risks to water and wastewater services either directly or indirectly by affecting power supply or transport access for water services operation and also through impacts to customers experiencing the effects of inundation of residential areas and businesses.

¹⁰ OPW. 2018. *Catchment Flood Risk Assessment and Management Programme*. Accessed: 06.01.2023. Available from: <https://www.floodinfo.ie/map/floodplans>

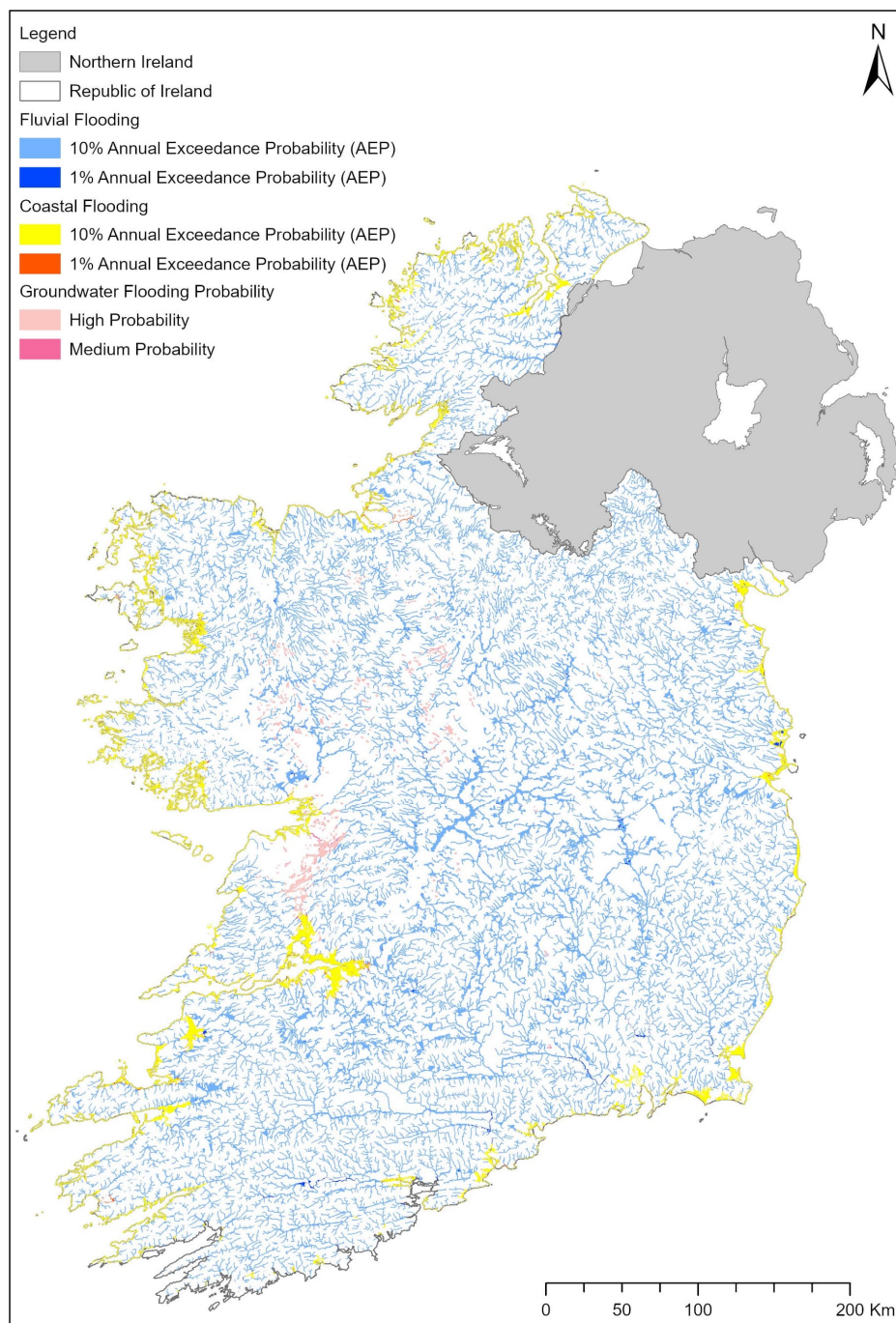


Figure C.12 Surface water and groundwater flood risk (GSI, 2023¹¹; OPW, 2023¹²)

C.1.4 Drought Risk

During the drought in Summer 2018, all of Uisce Éireann’s groundwater supplies were being monitored due to falling groundwater levels and a number of Uisce Éireann’s supplies were affected in terms of quality or resource availability. For example, during recent dry periods, particularly during the summers of 2018, 2020 and 2022, water conservation orders were implemented which affected areas of water supply with restrictions to customers water availability.

¹¹ GSI. 2023. *Data and Maps*. Accessed 09.08.2023. Available from: <https://www.gsi.ie/en-ie/data-and-maps/Pages/Geoheritage.aspx#Nationwide>

¹² OPW. 2023. *Flood maps*. Accessed 15.08.2023. Available from: <https://www.floodinfo.ie/>

Drought can cause low-flow conditions and higher water temperatures that lead to reduction of oxygen concentrations in the water. These environmental effects of drought contributed to fish kills seen in the summer of 2018 across the whole of Ireland. The fish kills caused by 2018 drought event may have increased the vulnerability of fish to acute pollution events as well as underlying levels of pollution. Environmental pressures caused by drought are less likely to affect resilient waterbodies that are in good ecological health (EPA, 2020a). The ecological health of waterbodies can also be negatively impacted by over-abstraction of water which can lead to reduction in river flows and lake levels. Active management of some at risk abstractions is needed to avoid negative impacts on waterbodies during drier periods. However, in general outside dry or drought periods, abstractions in Ireland do not put significant environmental pressures on both surface water and groundwater resources (EPA, 2020a).

C.1.5 Future Trends

WFD Environmental Objectives

The second cycle River Basin Management Plan (DHLGH, 2018)¹³ set out a programme of measures to improve water quality and the third cycle draft RBMP 2021- 2027 (published for consultation in 2021 with the final expected by the end of 2023)¹⁴ updates and takes this further. The current ecological status data can be used to assess progress against the environmental objectives that those measures were designed to achieve.

The evidence (EPA, 2022b) shows that there have been both improvements and declines in the water quality in all water body types over the 2016-2021 assessment period, and that these changes have largely offset one another at the national scale. In all, just over half of all water bodies have achieved their environmental objective and there has been little net change in this proportion since the last assessment. When just the second cycle RBMP Priority Areas for Action (PAAs) are considered, however, the trend is different to the national picture and a net overall improvement has been achieved. The draft RBMP 2021-2027 identifies 527 areas for focused attention, to be managed by a range of bodies including the Local Authority Waters Programme (LAWPRO) and the local authorities comprising three types; Areas for Restoration (including PAPs), Areas for Protection and Catchment Projects.

Water Abstraction

At the end of 2022, the government passed the Water Environment (Abstractions and Associated Impoundments) Act, 2022 (the Abstractions Act), introducing a new licensing regime which will ensure that national abstractions align with the requirements of the Water Framework Directive. The Abstractions Act has not yet commenced and the associated regulations and guidelines which will further detail the types of assessment and national methodology to be used are not yet published or in place. Until the new licensing regime is operational, all new abstractions developed by Uisce Éireann are to be based on conservative assessments of sustainable abstraction and studies are ongoing to identify where existing abstractions are affecting waterbodies.

Agricultural Policy and Water Protection

A significant proportion of water pollution arises from agricultural land. Teagasc (Agriculture and Food Development Authority) identify a risk-based approach to identifying areas of diffuse pollution on farmland with the highest risk of affecting a waterbody. The approach can support the work of LAWPRO and Agricultural Sustainability Support and Advisory Programme (ASSAP) which have been addressing the second

¹³ DHLGH. 2018. *River Basin Management Plan 2018 - 2021*. Accessed 20.08.2023. Available from <https://www.gov.ie/en/publication/429a79-river-basin-management-plan-2018-2021/>

¹⁴ DHLGH. 2021c. *Draft River Basin Management Plan for Ireland 2022-2027*. Accessed: 25.07.2023. Available from: <https://www.gov.ie/en/consultation/2bda0-public-consultation-on-the-draft-river-basin-management-plan-for-ireland-2022-2027/>

cycle PAAs to focus land management measures where they will be most effective. Recommendations¹⁵ have been made to extend ASSAP as part of supporting the forthcoming third cycle RBMP. Many of the areas of action proposed in the draft RBMP 2021-2027 mentioned above will aim to address pollution from agricultural land.

The National Action Programme under the Nitrates Directive will provide an opportunity to evaluate the need to amend existing farm management measures under the programme. Measures will be required to address the issues identified during farm inspections such as inadequate management of animal manures, contamination of waters by run-off from farmyards and structural defects in manure storage facilities.

Drinking Water Safety Plans and Catchment Management Plans

The European Union (Drinking Water Regulations (2023 (S.I. 99/2023)), (the EU (Drinking Water) Regulation 2023) transposed EU Directive 2020/2184 into Irish Legislation with effect from March 2023. The regulations aim to protect human health by enhancing drinking water standards. A requirement under the regulations – Drinking Water Safety Plans (DWSP) seek to protect human health by managing risks to water quality taking a whole catchment approach to manage risks from source through to the tap. The plans assess the risks of contamination of water sources and propose mitigation measures to minimise these risks. They then propose appropriate treatment processes and preventative measures for contamination risks in the water distribution system. As part of the Drinking Water regulations, risk assessment is required for catchment areas in the vicinity of abstractions, the supply system and the domestic distribution systems. Issues identified in these assessments will be set out and implemented in risk management plans. Uisce Éireann are committed to preparing DWSPs for all water supply zones (WSZs) and undertaking Catchment Management Plans to highlight source pressures and identify mitigation. These actions can benefit both the water environment and improve drinking water safety and reduce treatment costs.

Local Community Initiatives

To deliver significant improvements in the condition of waters it will be important to generate and harness bottom-up community involvement and ownership of the environmental issues, for example through the formation of River Trusts. There are now eight Rivers Trust Charities stretching from Donegal to Wexford (Slaney Rivers Trust, Nore Suir Rivers Trust, Blackwater Rivers Trust, Waterville Lakes and Rivers Trust, Maigne Rivers Trust, Moy Rivers Trust, Erne Rivers Trust and Inishowen Rivers Trust). Funds available from the Community Water Fund and from national and European research projects (LEADER and LIFE projects) are providing opportunities for local communities and farmers to get involved in local water quality catchment-based projects. Local community initiatives, with the support of the LAWPRO, have the potential to tackle threats to water protection and restoration more effectively by examining the risks and developing tailored solutions at a local level.

Citizen science also provides an opportunity for local communities to get involved in science projects that tell us about the quality of the aquatic environment. The Dragonfly Ireland 2019-2024 project is seeking volunteers to record sightings of dragonflies and damselflies while the Explore Your Shore project is looking for volunteers to identify the different types of animals and plants found in seashore rockpools.

Urban Wastewater

The Proposal for a revised Urban Waste Water Treatment Directive (UWWTD) was published by the European Commission in October 2022. It is envisaged that this revision will aim to take account of new standards and

¹⁵ Teagasc. 2021. External Expert Assessment of the Agricultural Sustainability Support and Advisory Programme (ASSAP) Report of the Independent Review Panel 12 October 2021. Available from: <https://www.teagasc.ie/media/website/crops/ASSAP-Expert-Review-Final-Report---pdf--22-Nov-2021.pdf>

challenges and to support improving water quality by further addressing urban wastewater pollution. The revised UWWTD is currently scheduled for adoption in 2024 with implementation in Ireland likely sometime in 2026. This revision is expected to drive further investment and improvement as it is implemented by Member States.

Since 2014 there have been significant improvements in wastewater treatment and discharges, and this is recognised in the draft RBMP 2021-2027. However, the existing infrastructure is ageing and dispersed while regulation standards are becoming more stringent. Significant investment will therefore be required to improve performance and reduce water pollution, but this will not be achievable in the short term. The EPA highlighted 91 urban areas (in mid-2022) where treatment must improve as a priority to address the following: (1) comply with UWWTD standards for the collection and treatment of urban wastewater; (2) eliminate discharges of raw sewage; (3) improve treatment where wastewater is the main pressure on waterbodies most at risk of pollution; and (4) protect the habitats of endangered freshwater pearl mussels.

Marine Planning Reform

The Marine Strategy Framework Directive (MSFD) requires European Member States, including Ireland, to reach good environmental status in the marine environment. As part of implementing the EU Marine Spatial Planning Directive (2014/89/EU), Ireland's National Marine Planning Framework (NMPF) (2021) has been produced to provide guidance for activities and developments affecting the marine environment up to 2040 and is a key enabler of Ireland's ability to meet the requirements of the MSFD. The Maritime Area Planning Act 2021 (as amended) was enacted in 2021 and the Maritime Area Regulatory Authority (MARA) was established in July 2023 - together these introduce a new legislative regime around consent for development and activities in the marine area. The NMPF provides policies for sustainable planning and management of marine resources, balancing ecological, economic and social objectives in relation to aspects such as the environment, biodiversity, commercial fisheries and renewable energy. As part of this, the NMPF includes specific objectives and planning policies related to water quality and to wastewater treatment and disposal.

Impacts of Climate Change on the Water Environment

Climate change impacts on the water environment include river flows identified by the EPA¹⁶ include:

- Increases in rainfall are expected to result in higher flow rates in winter and spring, of the order of 20% in winter by the mid to late twenty-first century, while reductions in the summer and autumn months of over 40% are likely in many catchments.
- Increased intensity of rainfall episodes- so that flood events are likely to become more frequent with extreme flood events, currently expected once in every 50 years, likely to occur once every 10 years by the second half of this century,
- Increased frequency and severity of flood events are likely to be exacerbated by rising sea levels and incidents of coastal erosion and flooding from increased storm activity will be magnified by sea level rise posing a serious risk to Ireland's coastal areas and major coastal cities.
- Increased risk of more frequent and severe droughts – and higher water temperature, reduced oxygen concentration and decreased water volume, during a drought, can act together to put further pressure on aquatic ecosystems already suffering the effects of water pollution. This highlights the importance of improving water quality to ensure more resilience to the additional pressures brought by climate change.

¹⁶ EPA. 2020d. *State of the Environment Report - EPA's companion online resource - Water*. Accessed: 25.07.2023. Available from: <https://www.epa.ie/our-services/monitoring--assessment/assessment/irelands-environment/water/>

C.1.6 Key Considerations for WSSP 2050 and the SEA

This section summarises the key challenges and opportunities to be taken into account in the environmental assessment of the WSSP 2050 related to the water environment.

Challenges

- Water abstraction from surface and groundwater and additional pressures on the environment related to climate change and increased frequency of drought periods and the need for sustainable abstraction for existing and new sources which will meet the forthcoming new licensing regime requirements.
- Water pollution from wastewater discharge, storm water, and water treatment discharge affecting receiving waterbodies including rivers, lakes, transitional and coastal waterbody ecosystems and contributing to effects on aquatic ecology, bathing waters, recreation and fisheries.
- Stormwater management: separating the wastewater and stormwater network, reducing the number of combined sewer overflows and potential to increase the use of Sustainable Urban Drainage Schemes (SUDS) in new development.
- Wastewater management: upgrading and maintaining wastewater treatment plants to address existing and also new contaminants and to meet existing and future standards and protect the environment.
- Water pollution including from diffuse sources such as agriculture forestry and urban runoff affecting raw water quality affecting drinking water treatment requirements, health and aquatic ecology.
- Challenges from climate change increasing pressure on the natural environment and increased risks for infrastructure – importance of supporting environmental resilience and developing infrastructure and operational resilience for water supply and wastewater services.

Opportunities

- Potential opportunities from improved efficiency in water use and wastewater reuse especially for agriculture and industry to reduce pressure on the environment for increased abstraction – and importance of raising awareness and communication on water conservation and circular economy opportunities.
- Understanding the pressures and effects on the water environment better and improving data, monitoring, knowledge sharing and making use of new digital and mapping technologies.
- Opportunities for collaboration with a range of stakeholders particularly in relation to addressing catchment wide issues, including source control, and developing new approaches including considering ecosystem services and valuing the wider benefits from nature-based solutions and catchment management.

The Water Environment baseline and trend in terms of challenges and opportunities is relevant to several of the WSSP 2050 Draft WSSP 2050's seven key 'Issues' summarised below in Table C.1.

Table C.1 SEA Topic Links with the Draft WSSP 2050

2050 Draft WSSP 2050- issues	1. Climate change	2. Awareness and behaviours	3. Circular economy	4. Digitisation, data and cyber	5. Environment and biodiversity crises	6. Legislation, policy and regulation	7. Existing assets and new approaches to service delivery
Water Environment relevance: H - high/M - medium/L -Low	H	H	M	M	H	H	H

C.2 Population, Economy, and Tourism and Recreation

C.2.1 Population Baseline Condition

The population of the Republic of Ireland in 2022 was 5,149,139. The 2022 Census marked the first time in 171 years that the population of Ireland surpassed 5 million people. After a constant decline since 1851, Ireland’s population recorded its lowest level in 1961 when it stood at 2,818,341. It then began to increase again and, in 2022, was 83% higher than 61 years previously. Between 2016 and 2022, Ireland’s population increased by 387,274 with ranges from 5% in Donegal, Kilkenny and Tipperary to 14% in Longford. Population changes by county show that Fingal had the largest natural increase (19,183), followed by Cork (county and city combined) (17,218) while Leitrim (770) and Sligo (1,373) were the counties with the smallest natural increases. The 2022 Census total population per local electoral area is presented in Figure C.13.

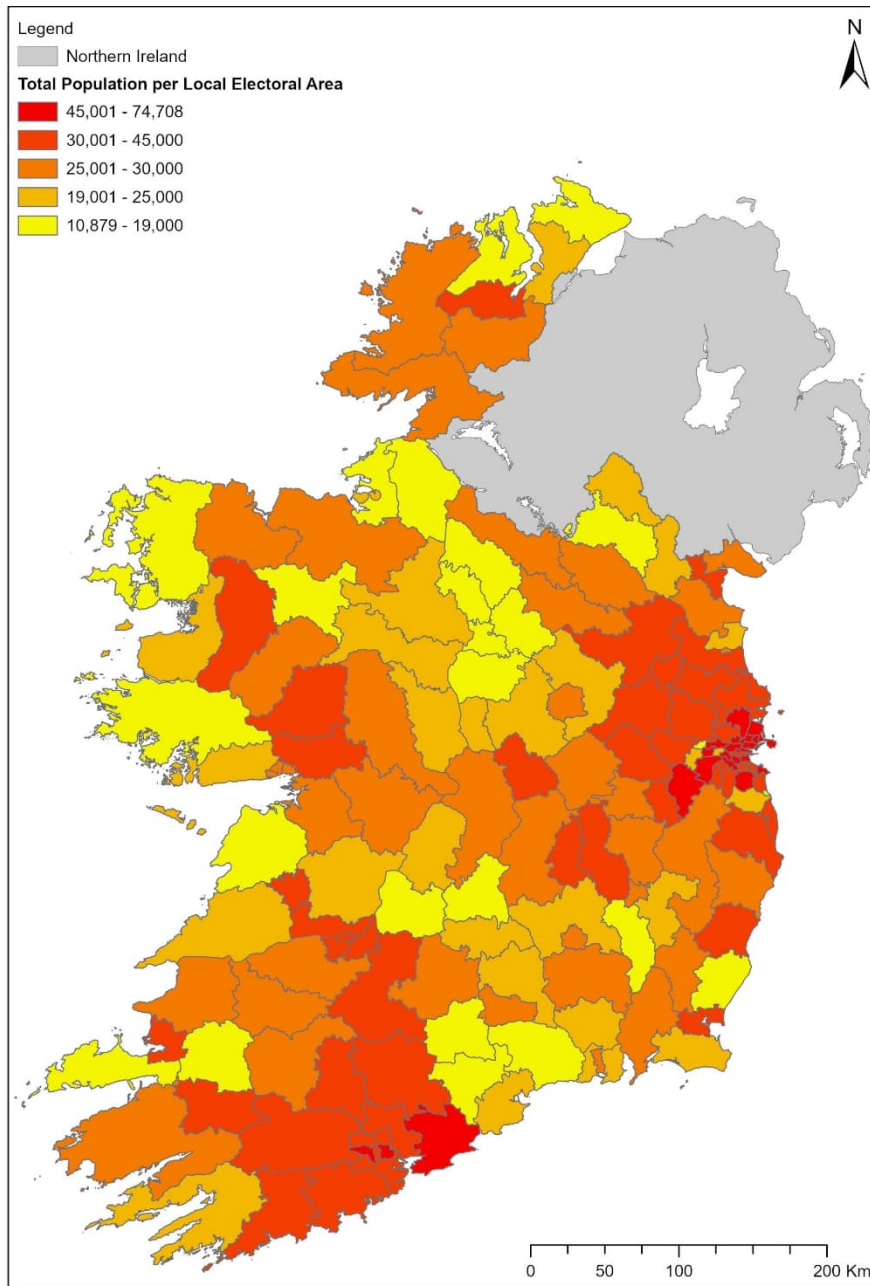


Figure C.13 Total population per local electoral area (CSO, 2023a)¹⁷

Table C.2 presents past population growth and future growth predictions in Ireland as a whole and per county¹⁸.

Table C.2 Overview of the Population in Ireland

Area	2016 Population*	2022 Population	2016-2022 Population Change (%)	2040 Population Projection*	2022-2040 Projection Population change (%)
Republic of Ireland	4,761,865	5,149,139	8.1	5,656,300	10.0

¹⁷ CSO. 2023a. *Census of Population 2022 - Summary Results*. Accessed: 25.07.2023. Available from: <https://www.cso.ie/en/releasesandpublications/ep/p-cpsr/censusofpopulation2022-summaryresults/>

¹⁸ DHLGH. 2021b. *ESRI Population Projections by Local Authority*. Accessed 15.06.2023. Available from: https://data.gov.ie/dataset/esri-population-projections-by-local-authority?package_type=dataset&msckid=2c415e2ed13411ecbe325aeb6c6a4161

Area	2016 Population*	2022 Population	2016-2022 Population Change (%)	2040 Population Projection*	2022-2040 Projection Population change (%)
Carlow	56,932	61,968	8.8	72,100	16.3
Cavan	76,176	81,704	7.3	91,000	11.4
Clare	11,8817	12,7938	7.7	135,000	5.4
Cork	542,868	584,156	7.6	649,800	11.2
Donegal	159,192	167,084	5	181,100	8.4
Dublin	1,347,359	1,458,154	8.2	1,608,200	10.3
Galway	258,058	277,737	7.6	294,100	5.9
Kerry	147,707	156,458	5.9	174,700	11.7
Kildare	222,504	247,774	11.4	283,400	14.4
Kilkenny	99,232	104,160	5	120,800	15.9
Laois	84,697	91877	8.5	108,300	17.9
Leitrim	32,044	35,199	9.8	37,400	6.2
Limerick	194,899	209,536	7.5	225,100	7.4
Longford	40,873	46,751	14.4	50,600	8.3
Louth	128,884	139,703	8.4	152,300	9.0
Mayo	130,507	137,970	5.7	135,100	-2.1
Meath	195,044	220,826	13.2	241,000	13.2
Monaghan	61,386	65,288	6.4	70,100	7.4
Offaly	77,961	83,150	6.7	97,100	16.8
Roscommon	64,544	70,259	8.9	75,800	7.9
Sligo	65,535	70,198	7.1	77,300	10.2
Tipperary	159,553	167,895	5.2	182,000	8.4
Waterford	116,176	127,363	9.6	133,200	4.6
Westmeath	88,770	96,221	8.4	107,500	11.8
Wexford	149,722	163,919	9.5	178,000	8.6
Wicklow	142,425	155,851	9.4	175,300	12.5

C.2.2 Economy and Employment Baseline Condition

On average, in Ireland, unemployment rates in Q2 of 2023 were 1% lower in comparison to the previous year (Table C.3).

Table C.3 Economy and Employment Statistics (CSO, 2023b)¹⁹

Area	Q2 2022 Unemployment rates (%)	Q2 2023 Unemployment rates (%)	2020 Household disposable income estimates per person (€)	2020 Indices of Disposable Income per person (state = 100)
Republic of Ireland	4.5	4.4	23,471	100.0
Border	5.4	3.9	19,535	83.3
Midland	4.7	3.6	19,076	81.3
West	4.5	3.7	20,878	89
Dublin	5.0	5.0	27,686	118
Mid-East	4.1	3.3	22,725	96.9
Mid-West	4.3	4.8	23,543	100.3
South-East	3.8	6.0	21,104	90
South-West	3.6	4.2	23,130	98.6

Nomenclature of Territorial Units for Statistics (NUTS) were created by Eurostat to define territorial units for regional statistics. There are eight NUTS3 regions in Ireland. In 2020, Dublin had the largest disposable income (€27,686 per person), rising to 18% above the state average. After Dublin, the next highest disposable income was Limerick (€26,248 per person). The Mid-West region is the only other region where income per person was above the state average by 0.4%. The Midlands region continued to be the poorest in terms of disposable income, at approximately 18.7% below the state average per person (CSO, 2023c)²⁰.

Population increase and expected economic growth has meant that housing and sustainable urban development have been made a priority for the National Development Programme; and the aim is to increase housing stock to supply the demand.

There were 8,452 new dwelling completions in Q3 of 2023, a rise of 14.4% compared with Q3 of 2022. At a regional level, there was an increase in completions from Q3 2022 to Q3 2023 for six of the eight regions of Ireland, including a 36.7% rise in Dublin. However, falls occurred in the South-West and South-East regions (CSO, 2023d)²¹.

C.2.3 Tourism and Recreation Baseline Condition

Tourism in Ireland is an important component of the economy. In 2019, total tourism on the island of Ireland generated €8.9/£7.8 billion. In addition to the €5.9/£5.1 billion generated by overseas visitors, a further €2.3/£2.0 billion was generated by residents of the Republic of Ireland, with the balance (€759/£666 million) coming from Northern Ireland residents. Overseas visitors continue to be the most valuable source of

¹⁹ CSO. 2023b. *QLF08 Persons aged 15 years and over*. Accessed 16.11.2023. Available from: <https://data.cso.ie/>

²⁰ CSO. 2023c. *County Incomes and Regional GDP*. Accessed 16.06.2023. Available from: <https://www.cso.ie/en/releasesandpublications/ep/p-cirgdp/countyincomesandregionalgdp2020/>

²¹ CSO. 2023d. *New Dwelling Completions Q3 2023*. Accessed 16.11.2023. Available from: <https://www.cso.ie/en/releasesandpublications/ep/p-ndc/newdwellingcompletionsq32023/#:~:text=There%20were%203%2C627%20scheme%20dwelling,apartments%20and%2017.2%25%20single%20dwellings>

tourists for the island of Ireland (North and South), accounting for 68% of nights, 66% of spend and 41% of all trips (Tourism Ireland, 2019)²².

There are two UNESCO (United Nations Educational, Scientific and Cultural Organisation) World Heritage Sites in Ireland and three UNESCO Sites on the Tentative List²³. There are six National Parks in Ireland²⁴ and three Fáilte Ireland’s tourism programmes²⁵. Table C.4 lists these sites for Ireland. There is also the Taste the Atlantic trail which is a collaborative initiative between BIM and Fáilte Ireland to promote seafood producers and their products along the trail.

Table C.4 World Heritage Sites, National Parks and National Tourism Programmes in Ireland

Sites, Parks and Programmes	Site name	County
UNESCO World Heritage Site	Brú na Bóinne – Archaeological Ensemble of the Bend of the Boyne	Meath
	Sceilg Mhichíl – The island of Sceilg Mhichíl	Kerry
UNESCO Tentative List	The Passage Tomb Landscape	Sligo
	Trans-Atlantic Cable Ensemble: Valentia	Kerry
	The Royal Sites of Ireland: Cashel, Dún Ailinne, Hill of Uisneach, Rathcroghan Complex, and Tara Complex	Tipperary, Kildare, Westmeath, Roscommon, and Meath
National Parks	Glenveagh National Park	Donegal
	Wild Nephin National Park	Mayo
	Connemara National Park	Galway
	Burren National Park	Clare
	Wicklow Mountains National Park	Wicklow
	Killarney National Park	Kerry
Fáilte Ireland’s tourism programmes	Ireland’s Ancient East	Cavan, Longford, Louth, Meath, Monaghan and Westmeath
	Ireland’s Hidden Heartlands	Leitrim, Roscommon, Longford, Clare, Westmeath, Cavan, Tipperary, Galway, and Offaly
	The Wild Atlantic Way	Donegal, Mayo, Clare, Kerry and Cork

²² Tourism Ireland. 2019. *Overseas tourism performance. 2019 Facts & Figures*. Accessed: 23.06.23. Available from: https://www.tourismireland.com/docs/default-source/visitor-facts-and-figures/visitor-facts-and-figures-2019.pdf?sfvrsn=d5913554_1

²³ UNESCO. 2023. *Ireland*. Accessed: 23.10.2023. Available from: <https://whc.unesco.org/en/statesparties/ie>

²⁴ NPWS. 2021. *National Parks*. Accessed: 04.08.2023. Available from: <https://www.npws.ie/national-parks>

²⁵ Fáilte Ireland. n. d. *The National Tourism Development Authority*. Accessed: 23.06.23. Available from: <https://www.failteireland.ie/>

C.2.4 Future Trends

Project Ireland 2040 accommodates growth by investment in rural towns and villages. As part of Project Ireland 2040 the National Development Plan (NDP)²⁶ sets out the Government's investment strategy and budget for the period 2021-2030.

Infrastructure investment identified in the NDP aimed at rural Ireland is for town and village regeneration, investment in depopulated areas, improvements in regional and local transport and road infrastructure, investment in transport services, flood relief measures, and funding for tourism, culture, and heritage projects. This will allow rural Ireland to retain and attract people to the area, and also attract new enterprises, assisting in diversifying rural economies into new sectors.

As a result of the NDP projected investments, according to COSMO (Core Structural Model of the Irish Economy), from 2021 onwards will result in:

- GDP (basic prices) to increase by 1.6 per cent more by 2030 than if investment remained constant at 2021 levels;
- Employed people to increase by 3.0 per cent more by 2030 than if investment remained constant at 2021 levels; and
- Total wages are expected to increase by 3.1 per cent more by 2030 than if investment remained constant at 2021 levels.

C.2.5 Key Considerations for WSSP 2050 and the SEA

Key challenges and opportunities in relation to Population, Economy, and Tourism and Recreation are:

Challenges

- Population and economic growth will increase the demand for water services and increase the pressure on available water resource. These pressures are taken into account in the supply demand balance projections to determine water supply needs in Uisce Éireann water resources planning (Irish Water, 2021) and updated on a regular basis;
- Patterns for settlement and economic growth will influence the level of demand for water services and where they are located and seasonal patterns such as peaks at tourist destinations;
- The NDP supports investments to improve water quality, water conservation and water future proofing; and

Opportunities

- There are opportunities for programmes to improve water quality and prevent or reduce pollutant load in the source waters. These include the Drinking Water Safety Plans and Catchment Management Plans and these plans, and the mitigation measures they identify, can also provide wider benefits to the environment as well as protecting water sources.

Table C.5 illustrates the links between this SEA topic and the WSSP 2050 issues presented in the Draft WSSP 2050

²⁶ DPER. 2021. *National Development Plan 2021-2030*. Accessed: 23.06.2023. Available from: <https://www.gov.ie/en/publication/774e2-national-development-plan-2021-2030/>

Table C.5 SEA Topic links with the Draft WSSP 2050

WSSP Draft WSSP 2050 – issues	1. Climate change	2. Awareness and behaviours	3. Circular economy	4. Digitisation, data and cyber	5. Environment and biodiversity crises	6. Legislation, policy and regulation	7. Existing assets and new approaches to service delivery
Population and health -relevance: H - high/M - medium/L - Low	M	H	L	M	H	M	H

C.3 Health and Wellbeing

According to the Irish Health Survey 2019 (CSO, 2020)²⁷ the key findings regarding the Ireland human health conditions are:

- Affluent people are more likely to feel their health status is very good or good than people who are disadvantaged – 92% of very affluent persons compared to 78% of persons who are very disadvantaged;
- Over a quarter of persons aged 15 years and over report having a long-lasting condition, with older persons reporting higher levels;
- Majority of persons (82%) report no limitations in everyday activities due to a health problem;
- Over a fifth (21%) of Unemployed persons report some form of mental ill-health compared to 9% of those In employment;
- Prevalence of hospital in-patient admissions rises with age and disadvantage level;
- In general, females and older people more likely to use a preventive health service;
- Physical activity declines with age and relative disadvantage level;
- Younger persons more likely to drink 6 or more units of alcohol in one sitting; and
- Over half of persons aged 15 years and over in the State are overweight or obese.

The survey is based on self-reported data from persons aged 15 years and over and outlines their view of their health status. Table C.6 provides well-being indicators for the whole of Ireland and NUTS3 Regions.

²⁷ CSO. 2020. *Irish Health Survey 2019*. Accessed: 19.06.2023. Available from: <https://www.cso.ie/en/releasesandpublications/ep/p-ihsmr/irishhealthsurvey2019-mainresults/healthstatus/>

Table C.6 National and Regional well-being indicators of persons aged 15 years and over

Well-being indicator		Republic of Ireland	Border	Midland	West	Dublin	Mid-East	Mid-West	South-East	South-West
Self-perceived health status	Very good or good (%)	85	84	79	82	86	87	83	88	84
	Fair (%)	12	13	15	15	10	9	14	8	12
	Bad or very bad (%)	3	3	5	3	3	4	3	4	4
Prevalence of long-lasting condition (%)	Yes (%)	26	24	31	24	26	22	30	23	29
	No (%)	74	76	69	76	74	78	70	77	71
Limitations in everyday activities due to a health problem	Severely Limited (%)	5	5	7	4	3	4	6	5	6
	Limited but not severely (%)	13	14	15	14	12	10	16	11	16
	Not limited at all (%)	82	82	78	81	85	86	78	83	78
Mental health status in previous two weeks	None to minimal depression (%)	86	88	83	90	86	87	87	87	83
	Mild depression (%)	9	8	10	7	9	9	9	9	11
	Moderate depression (%)	3	2	4	2	3	2	2	2	4
	Moderately severe or severe depression (%)	2	1	2	1	2	2	2	2	3
Average number of days absent from work due to a health problem	Absent from work due to a health-related problem (%)	20	12	15	19	26	19	18	13	19
	Average number of days absent (days)	4.1	5.3	6.4	3	4.3	3.2	5	3	4.3

Table C.7 provides an overview of participation in different types of physical activities in Ireland and in the eight NUTS3 regions (CSO, 2019)²⁸.

Table C.7 National and Regional participation in physical activity of persons aged 15 years and over

Activity	Participation (%)								
	Republic of Ireland*	Border	Dublin	Mid-East	Mid-West	Midland	South-East	South-West	West
Walk to get to and from places (2019)	81	78	89	83	74	83	83	81	77
Cycle to get to and from places (2019)	12	8	18	11	9	17	11	10	15
Do sports, fitness or recreational physical activities (2019)	49	35	61	49	52	47	44	47	56
Do muscle-strengthening activities (2019)	25	17	36	25	26	20	27	24	25

* Republic of Ireland data is an average of all eight NUTS3 Regions.

C.3.1 Drinking Water and Health Baseline Condition

Access to good quality drinking water is essential for human health and well-being. Uisce Éireann supplies 82% of people in Ireland with their drinking water and provides about two-thirds of households with wastewater services (DHLGH, 2020). New Drinking Water Regulations were signed by the Minister for Housing, Local Government and Heritage in March 2023. The new drinking water regulations focus on enhancing source to tap drinking water standards which aims to protect human health and are directed towards Uisce Éireann and other water suppliers. The new regulations update quality standards for water intended for human consumption in line with the latest recommendations of the World Health Organisation and establishes a watch-list mechanism to allow for the monitoring of substances or compounds of public or scientific concern to health, such as endocrine disruptors, pharmaceuticals and microplastics. The new regulations will also add additional quality measures that will ensure that drinking water supplied by Uisce Éireann is wholesome and clean. Wholesome and clean water is defined as water free from any micro-organisms and parasites and from any substances, which in numbers or concentrations constitute a potential danger to human health (DHLGH, 2021a)²⁹.

²⁸ CSO. 2019. *Physical activity of persons aged 15 years and over*. Accessed: 16.06.2023. Available from: <https://data.cso.ie/table/IH292>

²⁹ DHLGH. 2021a. *Drinking water quality*. Accessed: 17.08.2023. Available from: <https://www.gov.ie/en/publication/3870f-drinking-water-quality/>

Drinking water priorities identified by the EPA (EPA, 2023c)³⁰ as the most important and which are to be addressed by Uisce Éireann on a national level, to protect and improve drinking water supplies are identified as:

- Progressing action programmes for all Remedial Action List (RAL) schemes;
- Ensure that water is free of bacteria;
- Ensure that water is free of protozoan organisms;
- Ensure that water is free of chemical substances (trihalomethanes and pesticides);
- Ensure that water treatment plants are operated correctly; and
- Eliminating lead from the drinking water networks.

Uisce Éireann manages risks to the public water supplies by adopting Drinking Water Safety Plans for all supplies. Uisce Éireann uses several complex treatment processes to remove contaminants which may come from farming activities or commercial runoff and ensure drinking water is safe to use and consume. The EPA’s ‘Drinking Water Quality in Public Supplies Report 2022’ shows that over 99.7% of public water supplies comply with bacterial and chemical limits. However, the EPA reports that many Uisce Éireann supplies require robust treatment measures to secure their long-term resilience and safety (EPA, 2023c).

Table C.8 shows Uisce Éireann supplies on the EPA’s Remedial Action List (RAL) for Q2 of 2023 (EPA, 2023d)³¹. Supplies identified as “at-risk” require improvements to safeguard public health. The number of people served by public water supplies on the RAL in Q2 of 2023 was nearly 499,500, which is an increase from 481,000 at the end of 2022 and 374,00 at the end of 2021 (EPA, 2023c).

Table C.8 Uisce Éireann supplies on the EPA Remedial Action List for Q2 of 2023

County	Supply	Population
Carlow	Carlow North Regional	8,460
Clare	Corofin	1,319
	Ennistymon RWS	6,492
	West Clare RWS (New WTP)	8,702
	West Clare RWS (Old WTP)	3,028
Cork	Ballyclough and Mount North	1,977
	Castletownbere	2,328
	Fermoy	7,381
	Glashaboy	23,087
	Killavullen	791

³⁰ EPA. 2023c. *Drinking Water Quality in Public Supplies 2022*. Accessed: 17.08.2023. Available from: <https://www.epa.ie/publications/compliance--enforcement/drinking-water/annual-drinking-water-reports/drinking-water-quality-in-public-supplies-2022.php>

³¹ EPA. 2023d. *EPA Drinking Water Remedial Action List Q2 of 2023*. Accessed 17.11.2023. Available from: <https://www.epa.ie/publications/compliance--enforcement/drinking-water/annual-drinking-water-reports/epa-drinking-water-remedial-action-list-q2-of-2023.php#:~:text=The%20Remedial%20Action%20List%20is,%C3%89ireann%20to%20take%20corrective%20action>

County	Supply	Population
	Macroom	4,237
	Mitchelstown North	2,317
	Newmarket	9,724
	Whiddy Island	47
	Whitegate Regional	9,011
Donegal	Glenties-Ardara	3,518
	Lettermacaward	2,266
	Milford	3,714
Galway	Inishboffin	156
Kerry	Aughacaslá	340
	Cahersiveen	1,500
	Caragh Lake	1,886
	Kilgarvan	656
	Listowel Regional Public Water Supply	14,905
	Lyreacrompane	2,490
Kildare	Barrow Supply (Srowland WTP) ¹	80,592
Kilkenny	Kilkenny City (Radestown) WS	14,162
	South Kilkenny	6,028
Limerick	Foynes/Shannon Estuary PWS	6,986
	Limerick City Environs	114,764
Longford	Longford Central	17,354
Louth	Greenmount	3,836
	Tallanstown	2,010
Mayo	Louisburgh	824
Meath	Drumcondrath	1,151
	Navan-Mid Meath Kilcarn PWS	10,360
	Trim PWS	11,244
Offaly	Clara/Ferbane RWSS	7,341
Roscommon	North East Regional	7,997

County	Supply	Population
Tipperary	Clonmel Poulavanogue	2,435
	Galtee Regional	11,379
	Glengar	470
	Kilcash	221
	Nenagh Regional	14,483
	Roscrea	6,103
	Templetuohy	799
	Thurles Regional	11,394
Waterford	Dungarvan	12,687
	Graiguenagee	43
Wexford	Clonroche	527
	Enniscorthy	11,448
	Wexford Town	20,853
Wicklow	Aughrim/Annacurra	1,588
	Ballymorris	16

Uisce Éireann removed 87 public water schemes from the EPA’s RAL between 2014 and 2020, reducing the number of WTPs on the RAL. In July 2023 there were 26 Uisce Éireann supplies on a Boil Water Notice (BWN) or Water Restriction affecting a total population of 51,579 (EPA, 2023c). Uisce Éireann aims to lift BWNs through targeted investment. Since 2014 Uisce Éireann has lifted 243 BWNs impacting over 1.7 million people, of which, over 40,000 of these people were on BWN’s for a period of over a year.

C.3.2 Future Trends

In relation to drinking water and health, Uisce Éireann is involved in Project Steering Committees/Groups for various ongoing research projects which focus on contaminants of emerging concern (CECs) and include Microplastics, Phthalates, Pharmaceuticals/Pesticides & Antimicrobial Resistance (EPA and UKWIR funded). Uisce Éireann provides asset data and facilitates sampling of wastewater influent and effluent and raw drinking water. Uisce Éireann also participates in iNAP 2 (2021-2025) meetings, where the main objective is to increase environmental surveillance and monitoring for AMR to identify national levels and understand transmission routes.

C.3.3 Key Considerations for WSSP 2050 and the SEA

Key challenges and opportunities in relation to Health and Wellbeing are:

Challenges

- Raw water quality challenges remain for existing and emerging issues with implications for water treatment and Level of Service.

Opportunities

- There are opportunities for programmes to improve water quality and prevent or reduce pollutant load in the source waters. These include the Drinking Water Safety Plans and Catchment Management Plans and these plans, and the mitigation measures they identify, can also provide wider benefits to the environment as well as protecting water sources.

Table C.5 illustrates the links between this SEA topic and the WSSP 2050 issues presented in the Draft WSSP 2050

Table C.9 SEA Topic links with the Draft WSSP 2050

WSSP Draft WSSP 2050 – issues	1. Climate change	2. Awareness and behaviours	3. Circular economy	4. Digitisation, data and cyber	5. Environment and biodiversity crises	6. Legislation, policy and regulation	7. Existing assets and new approaches to service delivery
Population and health -relevance: H - high/M - medium/L - Low	M	H	L	M	H	M	H

C.4 Climate Change

Climate science is clear – 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. At current levels of global greenhouse gas emissions, the world remains on course to exceed the Paris Agreement’s temperature thresholds of either 1.5°C or 2°C above pre-industrial levels (EPA 2023e)³².

Climate change not only means changes in the average climate such as temperature but also changes in the frequency and intensity of extreme weather and climate events (EPA, 2023e).

The Climate Action Plan 2023 is the second annual update to Ireland’s Climate Action Plan 2019. This plan is the first to be prepared under the Climate Action and Low Carbon Development (Amendment) Act 2021, and following the introduction, in 2022, of economy-wide carbon budgets and sectoral emissions ceilings. The plan implements the carbon budgets and sectoral emissions ceilings and sets a roadmap for taking decisive action to halve our emissions by 2030 and reach net zero no later than 2050.

Reports from the Intergovernmental Panel on Climate Change reinforced the urgent need for greater action on climate adaptation globally. Observations show that Ireland’s climate is changing in terms of sea level rise, increases in average temperature, changes in precipitation patterns, and weather extremes.

Climate change is expected to have diverse and wide-ranging impacts on Ireland’s environment, society, and economic development, including on managed and natural ecosystems, water resources, agriculture and food security, human health, and coastal zones. The most immediate risks to Ireland from climate change are predominantly those associated with changes in extremes, such as floods, droughts, and storms.

³² EPA. 2023e. *Land Use Review: Fluxes, Scenarios and Capacity Synthesis Report*. Accessed: 25.07.2023. Available from: <https://www.epa.ie/publications/research/evidence-synthesis-reports/evidence-synthesis-report-4-land-use-review-fluxes-scenarios-and-capacity-synthesis-report.php>

A study by the EPA (2023e) found high levels of understanding among the Irish public about climate change and support for climate action with little variation depending on where people live. Almost nine in ten adults in all regions believe Ireland has a responsibility to act on climate change and almost eight in ten people in all counties believe acting on climate change will improve quality of life. There are minor regional variations in the level of concern about climate risks with, for example, slightly more people worried about water shortages in Dublin and the Mid-East region. In addition, somewhat more people are worried about severe storms in the West, Mid-West, and South-West regions. These spatial variations align with known environmental risks in these areas.

C.4.1 Climate Change Baseline Condition

Observations show that Ireland's climate is changing in terms of sea level rise, increases in average temperature, changes in precipitation patterns, and weather extremes. Satellite observations indicate that the sea level around Ireland has risen by approximately 2 to 3mm a year since the early 1990s. There is evidence of an increase in river flows across the country between 1972 and 2017.

However, there is also evidence in recent years of an increase in the frequency and intensity of potential drought conditions, especially in the east of Ireland.

Ireland has experienced first-hand the consequences of climate change as set out in the Climate Status Report for Ireland 2020, including:

- All seasons have seen a rise in temperature and the annual average surface air temperature has increased by over 0.9°C in the last 120 years;
- There has been a reduction in the number of frost days and shortening length of the frost season;
- Sea levels around Ireland have risen by approximately 2 to 3mm per year since the early 1990s; and
- Projections predict a significant reduction in average annual levels of spring and summer rainfall with a substantial increase in the frequency of heavy precipitation events in winter and autumn.

Temperature Trend

According to the Climate Action Plan (2023) between 1900 and 2019, temperatures in Ireland have increased by approximately 0.9°C, an average of about 0.075°C per decade (DECC, 2023)³³. Fifteen of the top twenty warmest years on record have occurred since 1990. The overall temperature trend is upwards and consistent with global patterns of change.

By the middle of this century (2041 – 2060) the average annual temperatures are projected to increase by between 1–1.2°C and 1.3–1.6°C depending on the emissions trajectory. The number of warm days is expected to increase and heat waves are expected to occur more frequently.

The EPA³⁴ also reports that the last five-year (2015–2019) and ten-year (2010–2019) average temperatures are the warmest on record. Additionally, since the 1980s, each successive decade has been warmer than any preceding decade since 1850 and 2019 was the ninth consecutive year with temperatures above normal in Ireland. Ireland has also seen a reduction in the number of frost days and shortening of length of the frost season and sea surface temperature in Irish waters has increased at a rate of approximately 0.6°C per decade since 1994.

³³DECC. 2023. *Climate Action Plan 2023*. Accessed: 22.06.23. Available from: <https://www.gov.ie/en/publication/7bd8c-climate-action-plan-2023/>

³⁴EPA. 2023. *What impact will climate change have on Ireland?*. Accessed: 25.07.2023. Available from: [https://www.epa.ie/environment-and-you/climate-change/what-impact-will-climate-change-have-for-ireland/#:~:text=Predicted%20impacts%20include%3A,lifecycle%20events\)%20of%20native%20species](https://www.epa.ie/environment-and-you/climate-change/what-impact-will-climate-change-have-for-ireland/#:~:text=Predicted%20impacts%20include%3A,lifecycle%20events)%20of%20native%20species)

Precipitation

According to the EPA (2020d), Ireland has seen an increase in average annual national rainfall of approximately 60mm or 5% in the period 1981-2010, compared to the 30- year period 1961-1990. Significant reductions are expected in average levels of annual, spring and summer rainfall. Projections indicate a substantial increase in the frequency of heavy precipitation events in Winter and Autumn (approximately 20%). Annual average rainfall in Ireland is presented in Figure C.14. Additionally, the number of very intense storms is projected to increase over the North Atlantic region. Projections suggest that the winter track of these storms may extend further south and over Ireland more often.

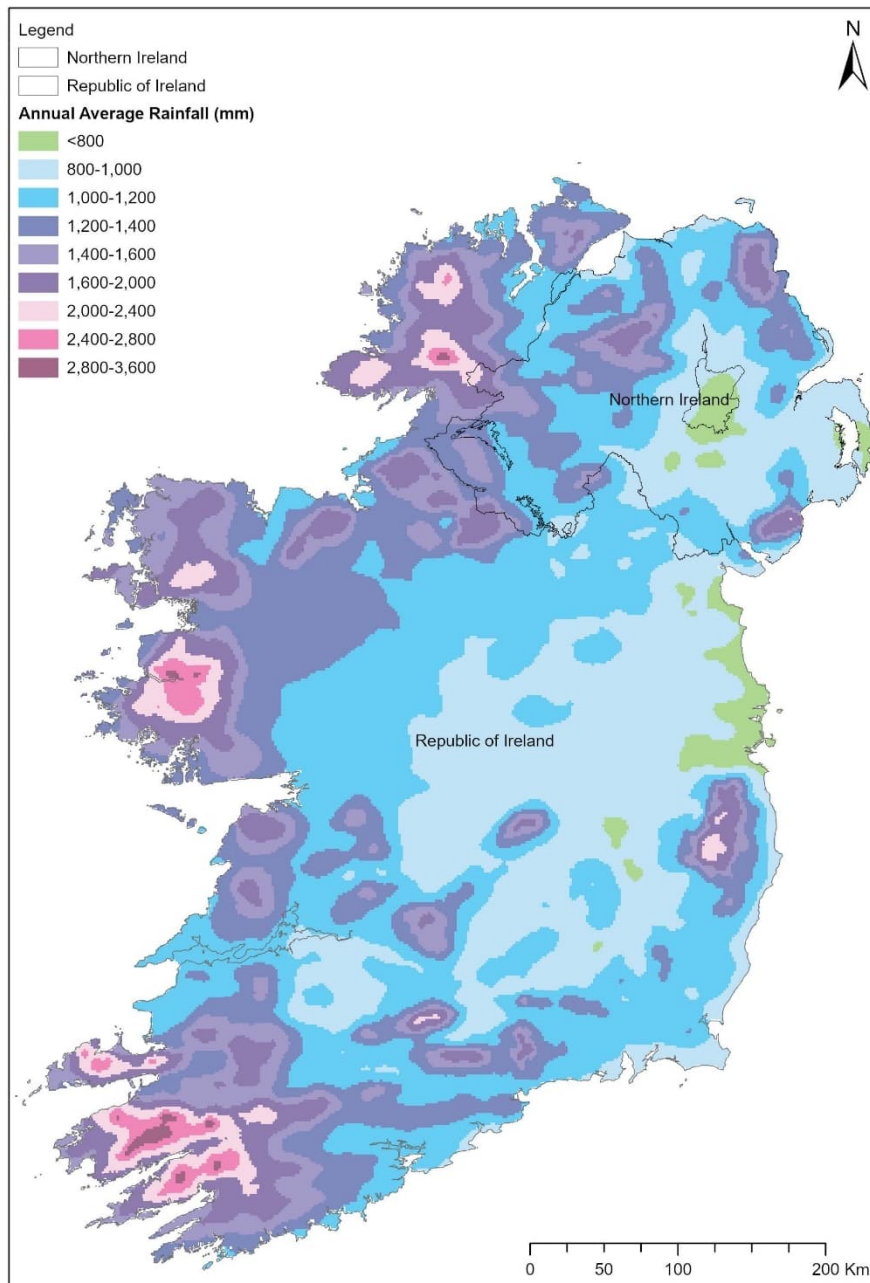


Figure C.14 Annual average rainfall in Ireland³⁵

Sea Level Rise

According to the EPA (2020d), the rate of global sea level rise for 2006–2015 of 3.6 mm per year, is unprecedented over the last century, and about 2.5 times the rate for 1901–1990. Sea level is projected to

³⁵ Met Éireann. 2023. *Annual average rainfall*. Accessed: 05.08.2023. Available from: <https://www.met.ie/climate/available-data>

continue to rise at this rate or greater. All major cities in Ireland are in coastal locations subject to tides, any significant rise in sea levels will have major economic, social and environmental impacts. Rising sea levels around Ireland would result in increased coastal erosion, flooding and damage to property and infrastructure.

Predicted Impacts

According to the EPA (2020d), these changes will cause extensive direct and indirect harm to Ireland and its people, with predicted impacts including increased likelihood of river and coastal flooding; increased pressure on water supply and water quality; and changes in wind speeds and storm tracks. The impact of climate change will be felt by every individual, household, and community in Ireland. The outcomes of the EPA's Climate in the Irish Mind study illustrate that there is a high level of awareness of climate change and its impacts, and there is a broad consensus on the need for strong and early action to reduce Ireland's greenhouse gas (GHG) emissions and to make Ireland climate resilient.

Marine Environment

The Climate Action Plan (2023) states that climate change is causing fundamental and potentially irreversible changes to our marine environment, with effects for all society (DECC, 2023). Global ocean warming and ocean acidification may result in direct consequences for our marine ecosystems. At the same time, the intensity of storm events has increased, threatening coastal communities and infrastructure. These threats put at risk the many benefits provided by our seas, including food, energy, minerals, climate regulation, coastal protection, transport, leisure, and health and well-being.

Across the marine sector, a number of actions have been progressed under the Climate Action Plan 2021, including identifying areas of climate action appropriate to the Seafood Development Programme 2021-27, and completing the National Strategic Plan for Sustainable Aquaculture.

The Climate Action Plan (2023) notes that significant developments are currently under way in the planning and consenting regime for the marine environment to support the ambitions for decarbonising the energy sector through the development of offshore renewable energy. Alongside this, work is being undertaken to designate further marine SACs and SPAs in the marine environment and to allow for the designation and management of Marine Protected Areas. This will facilitate the development of offshore renewable energy to progress at pace alongside the conservation, protection, and recovery of marine biodiversity.

C.4.2 Future Trends

Climate change is expected to have diverse and wide-ranging impacts on Ireland's environment, society, and economic development, including on managed and natural ecosystems, water resources, agriculture and food security, human health, and coastal zones. The most immediate risks to Ireland from climate change are predominantly those associated with changes in extremes, such as floods, droughts, and storms (DECC, 2023).

The National Adaptation Framework (NAF) identified 12 key sectors that would require Sectoral Adaptation Plans and are grouped under four themes: Natural and Cultural Capital, Critical Infrastructure, Water Resource and Flood Risk Management (with Flood Risk Management, Water Quality, and Water Services Infrastructure sector levels), and Public Health (DECC, 2023).

According to the Climate Action Plan (2023), the development of an updated NAF will be a priority action in 2023. This reflects the increasingly important role of adaptation in addressing climate change impacts. The revised NAF will underpin the development of a new cycle of Sectoral Adaptation Plans.

The NAF also identifies that the role of Local Authorities is critical in building climate resilience. Therefore, every Local Authority is required to develop a Climate Action Plan under the Climate Action and Low Carbon Development (Amendment) Act 2021; covering mitigation, adaptation, and citizen engagement.

The Climate Action Plan (2023) states that some of the impacts of climate change that could potentially impact priority sectors in Ireland include:

- Precipitation extremes and flooding, resulting in disruption of transport services, unsafe driving conditions and gradual deterioration of infrastructure;
- Increased water demand because of the increased frequency of heatwaves, leading to further strain on water transmission and distribution networks, as well as on supply (abstraction and storage);
- Projected changes in temperature and precipitation will result in the arrival of invasive species more suited to changed climate conditions, some of which may have negative impacts on the economy (e.g., via impacts on farming and fisheries);
- Projected increases are identified for the following:
 - Frequency of extreme precipitation events may result in more water-borne disease (e.g., E. coli) from contamination of drinking water because of overland flows of pollutants.
 - Annual average temperature, combined with wetter conditions, may result in enhanced environmental conditions for bacterial growth and viral survival with a potential increase in food-borne disease;
 - Sea levels and storm surge will result in increased frequency of coastal flooding and erosion, with significant impacts for coastal and heritage sites situated in proximity to the coast and on estuaries;
 - Intensity of windstorms and in the duration of the growing season, may result in increased windthrow leading to damage to overhead power lines;
 - Frequency of heatwaves will result in degradation of communications infrastructure (e.g., street cabinets), potentially leading to an increased requirement for active cooling;
 - Frequency of extreme precipitation events will result in increased levels of run-off and potential water quality issues, with implications for slurry storage and land spreading; and
 - Frequency of heatwaves and drought, resulting in the increased frequency of wildfires damaging forests stands.

C.4.3 Key Considerations for WSSP 2050 and the SEA

Key challenges and opportunities related to climate change mitigation and adaptation are set out below.

Challenges

The European Climate Law writes into law the goal for Europe's economy and society to become climate-neutral by 2050. The law also sets the intermediate target of reducing net greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels.

Climate neutrality by 2050 means achieving net zero greenhouse gas emissions for EU countries as a whole, mainly by cutting emissions, investing in green technologies and protecting the natural environment.

Changes in climate have direct and indirect influence on Uisce Éireann and the services it provides, and the changing climate will affect Uisce Éireann in many ways. Changes are already being felt and are expected to continue over the period to 2050 and beyond, and these include:

- Higher temperatures which lead to an increased demand for water;
- Higher temperatures will also impact receiving waters (rivers and the sea), potentially requiring new wastewater treatment practices. New treatment technologies for clean water may also be needed;
- More frequent extreme weather events and higher rainfall intensity can increase flood events and soil erosion with impacts on water quality from sediment and nutrients;
- Higher temperatures can increase vulnerability of aquatic ecosystems to pollution;
- Increased challenges for drought planning to protect the environment while maintaining water supplies;
- Increasing recurrence of droughts and floods threatens the food system as water insecurity is directly linked with food insecurity;
- Existing physical assets will need to manage additional rainfall and higher temperatures. They may be subject to increased fluvial and coastal flood and erosion risk; and
- Regulatory and policy commitments and compliance requirements on carbon emission targets and improving climate change resilience will have implications on operations and projects.

Opportunities

Opportunities to achieve wider environmental benefits, infrastructure and service resilience and cost efficiency alongside contributing to meeting climate targets.

Table C.10 illustrates the links between this SEA topic and the WSSP 2050 issues presented in the Draft WSSP 2050.

Table C.10 SEA Topic links with the Draft WSSP 2050

WSSP Draft WSSP 2050 – issues	1. Climate change	2. Awareness and behaviours	3. Circular economy	4. Digitisation, data and cyber	5. Environment and biodiversity crises	6. Legislation, policy and regulation	7. Existing assets and new approaches to service delivery
Climate Change relevance: H - high/M - medium/L - Low	H	H	H	M	H	H	H

C.5 Biodiversity, Flora and Fauna

Biodiversity in Ireland is facing ongoing pressures which has the potential to cause further deterioration to the condition status of habitats and species.

Global trends of biodiversity loss are reflected in Ireland. According to Ireland’s draft 4th National Biodiversity Action Plan (DHLGH, 2022b)³⁶, the main drivers of biodiversity loss are intensive agricultural and forestry

³⁶ DHLGH. 2022b. *Ireland’s 4th National Biodiversity Action Plan Draft for Public Consultation*. Accessed: 17.08.2023. Available from: <https://www.gov.ie/pdf/2file=https://assets.gov.ie/233057/f1a92f68-e668-498d-a56c-df777a19b549.pdf#page=null>

practices, overfishing, invasive species, changes in land use (particularly for residential, agricultural and commercial development) and the over-exploitation of resources such as peatland loss.

The 2019 conservation status assessments reported that there is ongoing decline for 46% of EU protected habitats and 15% of EU protected species (NPWS, 2019a)³⁷, with freshwater species most at risk. Although many mammal species were assessed favourably, such as seals, dolphins, and several whale and some bat species.

Nearly half of Ireland's rivers and lakes are in an unsatisfactory ecological condition and there has been a general pattern of decline in satisfactory water quality in Ireland's surface waters since the first assessment of ecological status was undertaken (2007-2009) (EPA, 2022b). These water quality declines have major consequences for biodiversity, with many freshwater species, such as the freshwater pearl mussel (DHLGH, 2022b) affected.

C.5.1 Biodiversity, Flora and Fauna Baseline Condition

Protected Areas

The Habitats Directive seeks to ensure the appropriate conservation of natural habitats and of wild fauna and flora. The Habitats Directive (92/43/EEC) was transposed into Irish law in 1997 by the EC (Natural Habitats) Regulations 1997 (S.I. No. 94 of 1997). The Regulations were subsequently revised and consolidated in the EC (Birds and Natural Habitats) Regulations 2011, as amended (S.I. No. 477 of 2011). Under the Directive, Ireland, like other member states, was required to establish an ecological network of Special Areas of Conservation – SACs (sites which host a range of natural habitats and species listed in Annex I and II of the Directive). The Birds Directive (2009/147/EC) ensures the appropriate protection of SPAs (sites which are classified for rare and vulnerable birds listed in Annex I of the Directive).

There are a total of 916 protected areas in Ireland (13.9% of land, 2.3% of marine waters), 604 Natura 2000 sites – 166 SPAs (Birds Directive) and 441 SACs (Habitat Directive) – as well as 309 nationally designated sites (BIS, 2022)³⁸. Figure C.15 presents Special Areas of Conservation and Special Protection Areas. (See Section 149C.13.2 for designated nature conservation sites in Northern Ireland).

Ireland hosts 232 species that are protected under EU law, 60 of which are protected under the Habitat Directive (BIS, 2022). The number of species and habitats protected in each site varies depending on the location of the site, the biodiversity in the region, the designation being used, and the features that the site is being created to protect.

The NPWS (2023a) lists the following SAC habitats for Ireland, including raised bogs, blanket bogs, turloughs, sand dunes, machair (flat sandy plains on the north and west coasts), heaths, lakes, rivers, woodlands, estuaries and sea inlets; many of which are reliant upon good water quality and quantity. The 25 Irish species which must be afforded protection include Salmon, Otter, Freshwater Pearl Mussel, Bottlenose Dolphin and Killarney Fern. SACs in Ireland cover approximately 13,500 km² of Ireland with around 53% of this being land and the remainder being attributed to water (marine or large lakes).

The SPAs designated under the Birds Directive include wetlands, bays and estuaries, agricultural and inland habitats and marine colonies. According to the NPWS (NPWS, 2023b)³⁹, every summer 24 species of seabird, numbering over half a million individuals, seek out suitable breeding habitat principally on mainland cliffs and

³⁷ NPWS. 2019a. *The Status of EU Protected Habitats and Species in Ireland. Volume 1: Summary Overview*. Unpublished NPWS report. Edited by: Deirdre Lynn and Fionnuala O'Neill.

³⁸ BIS. 2022. *Ireland*. Accessed: 10.08.23. Available from: <https://biodiversity.europa.eu/countries/ireland>

³⁹ NPWS. 2023b. *Special Protection Areas (SPA)*. Accessed: 04.08.2023. Available from: <https://www.npws.ie/protected-sites/spa>

on marine islands. These breeding sites are in close proximity to the rich foraging habitat of continental shelf waters. Ireland is particularly important for its breeding populations of Manx Shearwater and Storm Petrel.

Ireland is situated along the east Atlantic flyway for waterbirds that breed in more northerly latitudes. Ireland's typically mild and wet winters make the wetlands an important resource for over 50 species, with 750 thousand waterbirds migrating on passage to more southerly resorts or to spend the entire winter each year (NPWS, 2023b). In some cases, significant proportions of the biogeographic populations of waterbirds overwinter in Ireland (e.g., Light-bellied Brent Goose, Black-tailed Godwit, Whooper Swan, Greenland White-fronted Goose and Ringed Plover).

Ireland's SPA Network covers over 597,000 hectares of marine and terrestrial habitats (NPWS, 2023b). The marine areas include some of the productive intertidal zones of Ireland's bays and estuaries that provide vital food resources for several wintering wader species. Marine waters adjacent to the breeding seabird colonies and other important areas for sea ducks, divers and grebes are also included in the network.

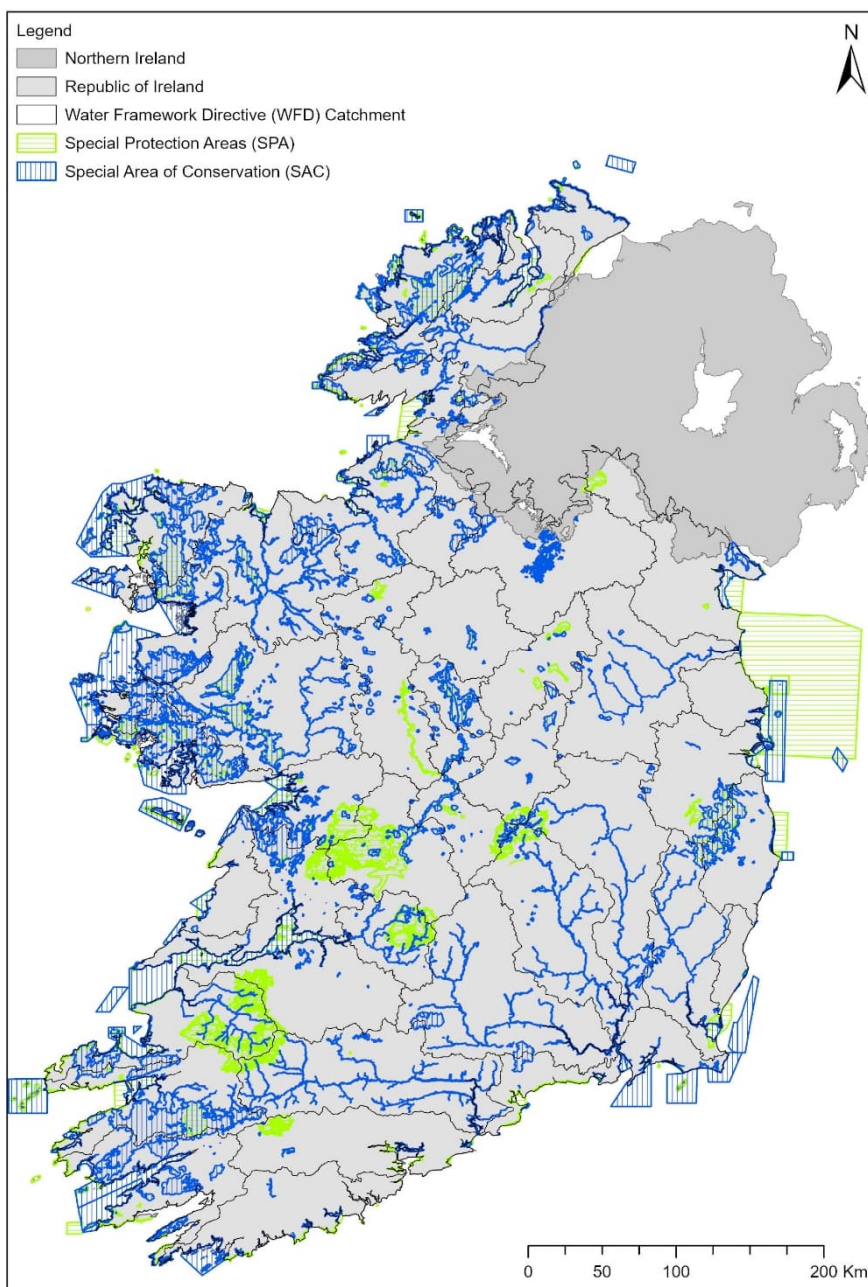


Figure C.15 Special Areas of Conservation and Special Protection Areas (NPWS, 2023a) ⁴⁰

The terrestrial areas of the SPA network include coastal habitats, inland wetland sites important for wintering waterbirds and extensive areas of blanket bog and upland habitats that provide breeding and foraging resources for species; many of which are reliant upon good water quality and quantity. Agricultural land also represents a share of the SPA network ranging from extensive upland areas where hedgerows, wet grassland and scrub offer feeding and/or breeding opportunities to the intensively farmed coastal polder land (NPWS, 2023b).

There are also 45 Ramsar sites, which are wetlands of international importance, including shallow marine waters, rocky shores, estuaries, intertidal mudflats or marshes, plus inland rivers, lakes, wetlands and peats. The majority of these sites are also SACs and/or SPAs. Figure C.16 presents designated sites including Ramsar sites, Natural Heritage Areas, Proposed Natural heritage Areas, National Parks and Nature Reserves.

⁴⁰ NPWS. 2023a. *Special Areas of Conservation (SAC)*. Accessed: 04.08.2023. Available from: <https://www.npws.ie/protected-sites/sac>

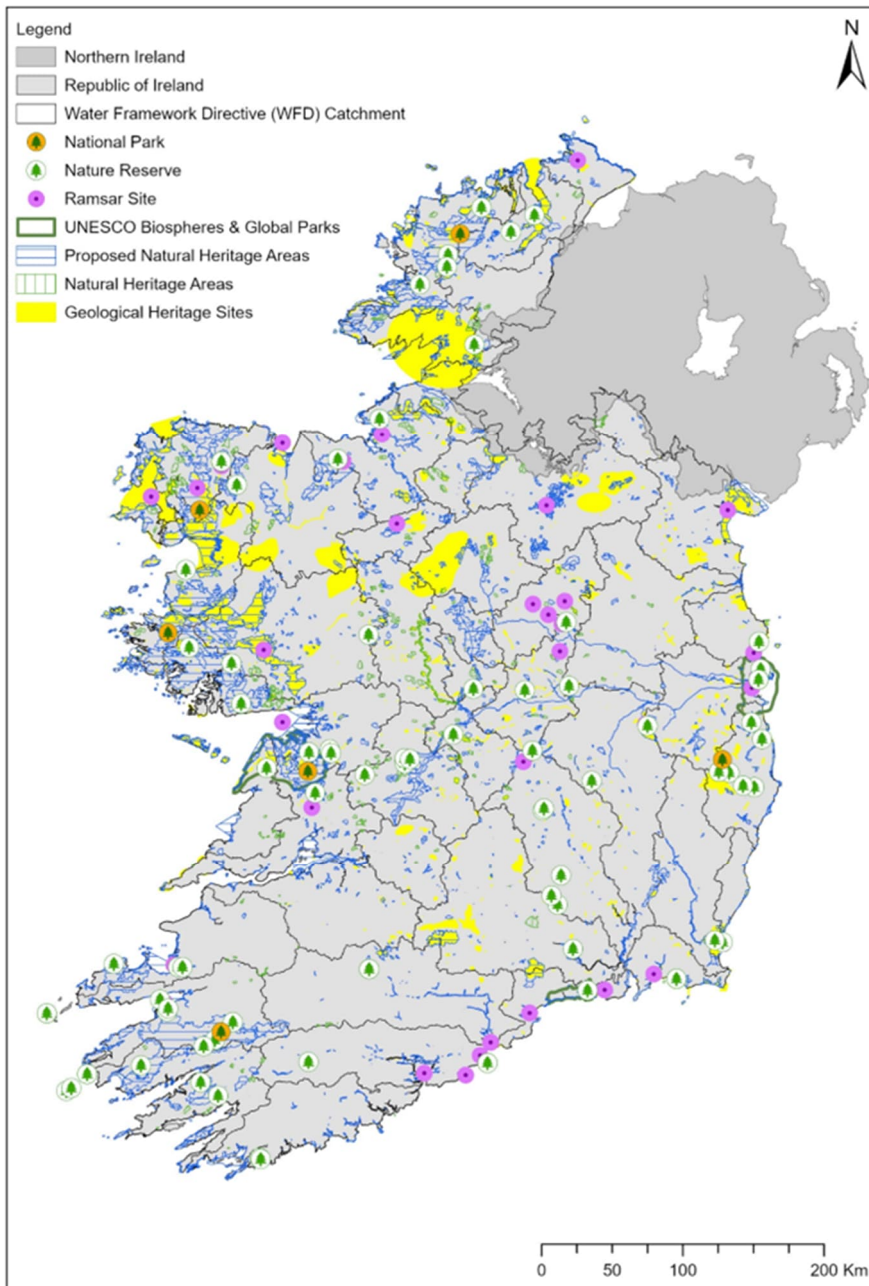


Figure C.16 National Biodiversity, Natural Heritage and Geological Designated sites (NPWS, 2023a)

The status of protected species and habitats in Ireland is monitored by the NPWS. Conservation status is assessed at a national level and the assessment takes into account the status of the range, area, structure and functions as well as future prospects of each species and habitat before defining an overall status for each.

Only 15% of protected habitats in Ireland had favourable overall conservation status (Figure C.17). Nationally only 2% of habitats show improving status trend with 53% stable and 46% declining (NPWS, 2019b)⁴¹.

At a national level pressures and threats are recorded in 54 of the 59 habitats assessed. The most frequent pressures recorded in habitats relate to the agriculture category which impact over 70% of habitats. Development and operation of transport systems which includes roads, paths, shipping lanes and associated

⁴¹ NPWS. 2019b. *Article 17 Reports 2019*. Accessed: 04.08.2023. Available from: <https://www.npws.ie/publications/article-17-reports/article-17-reports-2019>

light and noise pollution, impacts 10% of habitats by combined High and Medium-importance pressure or threat (NPWS, 2019b).

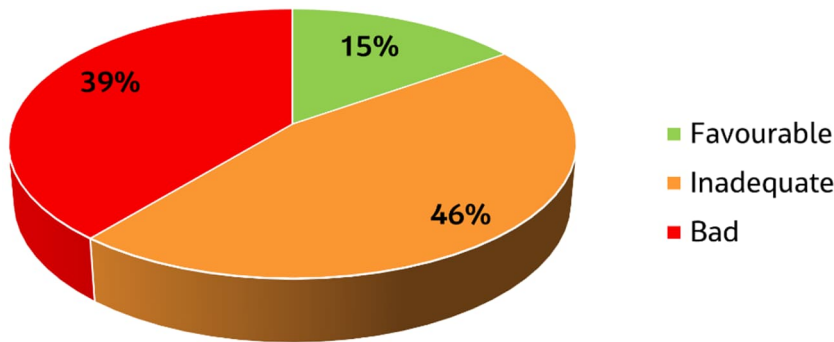


Figure C.17 Status of Habitats in Ireland in 2019 (NPWS, 2019b)

50% of protected species in Ireland had favourable overall conservation status (Figure C.18), with only 15% of species show improving status trend with 49% stable and 13% declining (NPWS, 2019b).

Pressures are identified as impacting on 46 of the 57 taxa (taxonomic groups) assessed. Threats are identified for 48 taxa. Development and operation of transport systems which includes roads, paths, shipping lanes and associated light and noise pollution, impacts 27% of species by combined High and Medium-importance pressure or threat (NPWS, 2019b).

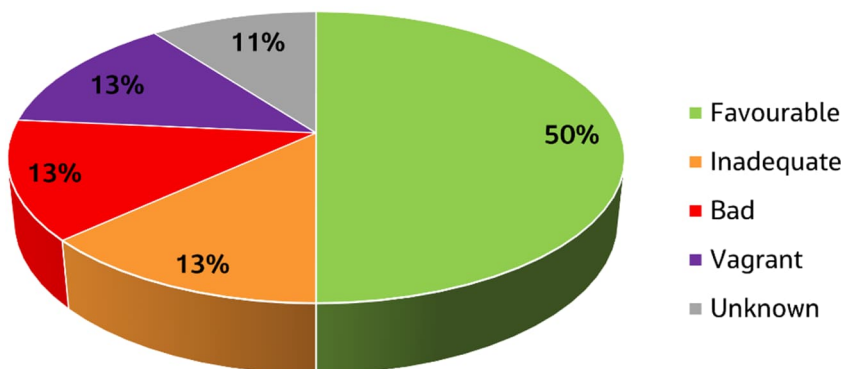


Figure C.18 Status of Species in Ireland in 2019 (NPWS, 2019b)

Most Irish designated sites listed under the Habitats Directive are in Unfavourable status and almost half are demonstrating ongoing declines. The majority of species listed on the Habitats Directive are, however, in Favourable status in Ireland, and stable, although a small number are considered to be in Bad status and continue to require concerted efforts to protect and restore them (NPWS, 2019b).

The main pressures on habitats are ecologically unsuitable grazing levels – which can be undergrazing (or even abandonment) as well as overgrazing; pollution of freshwaters and coastal marine waters; drainage and/or cutting of peatlands; invasive species; and recreational pressures (NPWS, 2019b).

Most of the other habitats considered in Unfavourable status are being affected by pressures which show little sign of abating in the near future. These include some of the lake and coastal marine habitats, which are affected by excessive nutrient loading from the surrounding catchment, and which could take a long time to fully recover (NPWS, 2019b).

The draft third cycle RBMP 2022-2027 (DHLGH, 2021c) identifies the current situation for protected areas under the WFD including water dependent habitats and species. According to the draft RBMP, many of the habitats and species listed for protection in both the Birds and Habitats Directives are water dependent, with approximately 88% of SACs having water dependent habitats or species, and 90% of SPAs having water

dependent bird species. The waterbodies were assessed to see if they met the supporting water quality requirements for habitats and species using their assessed status for the period 2013-2018. The draft RBMP reports that of the 44 Groundwater Dependent Terrestrial Ecosystems delineated and assessed, three associated groundwater bodies were at Poor status and 41 were at Good status for the 2013-2018 assessment period.

Species Status

The NPWS (2019b) report shows that the species status assessments are much better, with 57% in Favourable status, including most of the bat species, seals, and cetaceans. A declining trend is reported for 15% of species, with freshwater species most at risk. However, an improving trend is reported for 17% of species, with populations of species such as the otter and pine marten and many bat species expanding. The natterjack toad was assessed as Bad with an improving trend in 2013, however, this has been assessed as a stable trend in 2019 as ongoing improvements to restore Range are not exhibiting adequate positive results. The salmon, which is one of the most monitored species in Ireland, is stable due to a very recent improving trend, though still in low numbers, and is susceptible to a wide range of pressures during its time in the ocean as well as in freshwater. Other fish species such as the sea lamprey, pollan and twaite shad remain in Bad status. The sea lamprey is prevented from reaching suitable breeding habitat in river by weirs; the pollan is impacted by nutrient enrichment in the large lakes where it lives, and by introduced competing fish species, and there are concerns about the habitat quality at spawning sites for twaite shad. The greatest concern continues to be the freshwater pearl mussel, as only a few rivers have populations that show juvenile recruitment.

The freshwater pearl mussel, which has additional requirements for supporting conditions set out in the Freshwater Pearl Mussel Regulations (S.I. No 296 of 2009). For the Freshwater Pearl Mussel (FWPM), the draft RBMP reports that of the 97 river waterbodies with designated FWPM habitats, 20 had achieved the required standard as set out in the FWPM Regulations (DHLGH, 2021c).

Aquatic Habitats (including Freshwater, Coastal and Marine)

Aquatic biodiversity encompasses freshwater ecosystems including lakes, ponds, reservoirs, rivers, streams, groundwater, wetlands, coastal and marine; therefore, it will be significant to the Strategic Plan. Aquatic species are dependent on clean water and suitable flows; macro-invertebrates and some species of fish, such as Atlantic salmon, are therefore good indicators of the condition of the overall water environment. Water supply can involve modification to watercourses, such as new abstractions or increases to existing abstraction regimes, which can reduce water flows and, in turn, reduce a watercourse's potential to support fish life.

The NPWS has identified 44 different water dependent habitat types and 22 water dependent species in Ireland. Of these, the freshwater pearl mussel, is considered to be a highly sensitive surface water dependent species in Ireland, and coastal lagoons a highly sensitive water dependent habitat. Of the water dependent habitats, 11% are deemed to be at Favourable Conservation Status, while 50% of water dependent species are at Favourable Conservation Status (NPWS, 2019b).

Coast and Marine Environment

Ireland's coastline and marine environment is teeming with life, playing host to 24 species of whales and dolphins, 35 species of sharks, 2 species of seal, 24 species of seabirds, over 250 species of marine plants and

hundreds of species of fish and invertebrates. Losing just one species from an ecosystem can have a detrimental impact on the whole community⁴².

In Ireland, the Habitats Regulations, is currently the only legislative instrument providing protection to habitats in the marine environment. For habitats, this protection regime is applicable within the Exclusive Economic Zone. Under this legislation, a series of habitats are identified for which SACs must be created and within which these habitats must be maintained at favourable conservation status.

The coastline and oceans are made up of many types of zones and habitats. The zone we are most likely to encounter is the coastal zone, the area of transition between land and sea. Moving seaward past the coastal zone is the intertidal zone, the area of seashore between the high and low tide. From there past the low tide line out to the continental shelf there is the subtidal zone, and then the oceanic zones to the deepest parts of the ocean (Clean Coasts, 2023).

Within these zones exists a myriad of habitats and species. These habitats are some of the most complex and dynamic on earth and range from being fully emerged to fully submerged depending on their proximity to the shoreline. The dynamic nature of the ocean means in order to survive, species must adapt to changing levels in light, temperature, salinity, oxygen and pressure.

Invasive Species

With increased globalization there is an increase in the movement of non-native species around the world and numerous non-native species, many introduced only in the last 200 years, have become successfully established over large areas of Europe⁴³. Research by the European Commission funded DAISIE project, showed that non-native species are invading Europe at an unprecedented rate. 10,822 non-native species are listed for Europe of which 10-15% are expected to have a negative economic or ecological impact⁴⁴. This is demonstrated by trend analysis of non-native species introductions for Ireland where 13% of the species recorded and assessed in Ireland are high impact invasive species⁴⁵. The study assessed 377 non-native species; of these, 21% occur in freshwater environments. The trend analyses also showed that four times as many species were recorded in the 20th Century as in the previous one with the trend of introductions increasing dramatically from 2001 to 2010 for high impact invasive species. Freshwater environment showed the greatest rate of invasive species increase since 1980.

In addition to the objective to halt biodiversity loss, Ireland has a responsibility to prevent the spread of invasive species. An invasive species is a non-native species which has a tendency to spread to an extent determined to cause damage to the environment, the economy or human health in the country into which it has been introduced. Invasive species can dominate and marginalise native species, lowering the value of the overall ecosystem. Invasive species (including aquatic species) in Ireland are controlled under regulations 49 and 50 of the Habitats Regulations. The 'Third Schedule' of the regulations provides an extensive list of the non-native species subject to those restrictions, which includes some of the following:

- Asian clam* (*Corbicula fluminea*);
- Zebra mussel* (*Dreissena polymorpha*);
- Giant hogweed (*Heracleum mantegazzianum*);

⁴² Clean Coasts. 2023. *Marine Biodiversity in Ireland*. Accessed: 04.07.2023. Available from: <https://cleancoasts.org/marine-biodiversity-in-ireland/#species-directory>

⁴³ Hulme, P.E., Roy, D.B., Cunha, T. & Larsson, T. B. 2009. *A pan-European inventory of alien species: rationale, implementation and implications for managing biological invasions*. Handbook of alien species in Europe (ed DAISIE), pp. 1-14. Springer, Dordrecht.

⁴⁴ European Commission. 2008. *Commission presents policy options for EU strategy on invasive species*. Press release: European Commission – IP/08/1890 05/12/2008. Accessed: 12.07.2023. Available from: http://europa.eu/rapid/press-release_IP-08-1890_en.htm

⁴⁵ O'Flynn, C., Kelly, J. and Lysaght, L. 2014. *Ireland's invasive and non-native species – trends in introductions*. National Biodiversity Data Centre Series No. 2. Ireland.

- Nuttall's pondweed* (*Elodea nuttallii*);
- Himalayan balsam (*Impatiens glandulifera*);
- Giant rhubarb (*Gunnera tinctoria*);
- Japanese knotweed (*Reynoutria japonica*); and
- Rhododendron (*Rhododendron ponticum*).

As there are likely to be a multitude of introduction pathways for very many non-native species, prioritizing those pathways that are likely to introduce most invasive species with potential to have the highest impact, is the most effective way to target limited resources to have the greatest preventative effect.

EU Regulation on Invasive Alien Species and Pathway Action Plans

The EU Regulation on Invasive Alien Species (IAS) entered into force on 1st January 2015. This Regulation is based on the Convention on Biological Diversity's Guiding Principles of prevention, prioritization and coordination and seeks to address the problem of Invasive alien species in a comprehensive manner. The objective is to protect native biodiversity and ecosystem services, as well as to minimize and mitigate the human health or economic impacts that these species can have.

Under Article 13 (1) of the EU Regulation on IAS, Member States are required to carry out comprehensive analysis of the pathways of unintentional introduction and spread of invasive alien species and 'identify the pathways which require priority action because of the volume of species or of the potential damage caused by the species entering the Union through those pathways. By analysing the risk of each of the IAS of Union concern being introduced and spread in Ireland with the potential impact they may have, the associated pathways are ranked and prioritized. For the priority pathways, Pathway Action Plans (PAPs) are developed.

The Article 13 requirement for development of pathway action plans is in line with the international Convention on Biological Diversity Strategic Plan for Biodiversity 2011-2020, Aichi Target 9⁴⁶ and the similar European Commission's Target 5 of the EU Biodiversity Strategy to 2020 which states 'By 2020, Invasive Alien Species and their pathways are identified and prioritized, priority species are controlled or eradicated, and pathways are managed to prevent the introduction and establishment of new IAS'.

C.5.2 Future Trends

There are many challenges to address in the future. These challenges will be further exacerbated by the effects of climate change, particularly on peatland habitats and fish species. Much will depend on the identification and development of necessary conservation measures and the elaboration of mechanisms for the delivery of these measures in the next period. Operational Programmes accessing EU funding instruments will need to be used to meet the strategic national and EU objectives for biodiversity, including in Natura 2000.

Future trends will be influenced by changes/additions to existing designated sites (SACs, SPAs and NHAs). A number of pNHAs may be reviewed and upgraded to NHAs and, similarly, sites listed as tentative on the UNESCO Heritage List may be upgraded to designated heritage sites.

Habitats and species within and outside protected sites are all potentially affected by climate change, and this can also mean that they are more vulnerable to other pressures such as from land loss, disturbance, severance and fragmentation.

Invasive species which are listed as potential threats may become established threats in the future. The continuing development of the National Biodiversity Data Centre National Invasive Species Database will aid

⁴⁶ Convention on Biological Diversity. 2010. *The Convention on Biological Diversity*. Accessed 20.04.23. Available from <https://www.cbd.int/>

in the documentation of the distribution of invasive species in Ireland. These reports and datasets will go towards the implementation of the recent European legislation on halting the spread of invasive species.

The challenges involved in protecting Ireland's habitats and species are now more serious than ever and need urgent action. But nature can bounce back under the right conditions. Implementing national biodiversity policies, such as the National Biodiversity Action Plan (NBAP), requires an increased level of collaboration and coordination across multiple sectors and the whole of society. This can also give rise to indirect co-benefits for other sectors and environmental issues such as climate change and water quality (EPA, 2020a).

The third cycle draft RBMP (DHLGH, 2021c) is expected to be finalised in 2023. The draft plan includes proposals for a range of measures intended to support improvements to water quality and biodiversity, addressing nutrients from agriculture, developing a new Controlled Activities for the Protection of Waters regime to address physical condition of waterbodies, a restoration programme to address past impacts of construction on or near waterbodies programme, review of Waste Water Discharge Licences, and an expansion on the Priority Areas for Action - including Areas for Restoration, Areas for Protection and Catchment Projects.

Ireland's 4th NBAP has been in development since October 2021. The Plan will set the national biodiversity agenda for the period 2023-2027 and aims to deliver the transformative changes required to the ways in which the nature is valued and protected. Key considerations in the development of the draft NBAP are set out below:

- Build on the successes of previous NBAPs, while addressing shortfalls and implementation challenges;
- Expand the governance and oversight of the NBAP and develop a robust Monitoring and Evaluation Framework to track progress;
- Achieve buy-in and ownership of the NBAP across all levels of government and society;
- Embed biodiversity at the heart of climate action;
- Achieve greater coherence between biodiversity policy and other policy areas;
- Strengthen compliance and enforcement of existing legislation;
- Increase focus on addressing the root causes and drivers of biodiversity loss rather than consequences of biodiversity loss;
- Determine biodiversity priorities, allocate financial and other resources, internalise the value of nature and recognise the cost of inaction; and
- Significantly strengthen the science base and enhance data accessibility.

C.5.3 Key Considerations for the WSSP 2050 and SEA

Key challenges and opportunities in relation to Biodiversity, Flora and Fauna:

Challenges

- Water quality impacts on aquatic habitats and species related to operational activities such as abstraction and wastewater discharges;
- Barriers for species movement avoiding creating barriers and taking opportunities for removing barriers or incorporating fish/eel passes in existing barriers and for improving habitat connectivity along riparian corridors and in the wider landscape;

- Avoiding contributing to the spread of invasive species during construction or operational activities; and
- Construction and/or operational impacts on terrestrial and aquatic habitats and species, including potential for disturbance (particularly on marine mammals) and indirect impacts.

Opportunities

- Opportunities for reducing pollution loads from wastewater discharge and ensuring sustainable abstraction;
- Opportunities to include biodiversity enhancement measures in schemes to ensure no net biodiversity loss and potentially achieve net gain and improved connectivity; and
- Opportunities for multiple benefits from habitat creation/ restoration and potential to capture the value of these using natural capital and ecosystems services approaches which can support the use of nature-based solutions and catchment management approaches.

Table C.11 illustrates the links between this SEA topic and the WSSP 2050 issues presented in the Draft WSSP 2050.

Table C.11 SEA Topic links with the Draft WSSP 2050

WSSP Draft WSSP 2050 – issues	1. Climate change	2. Awareness and behaviours	3. Circular economy	4. Digitisation, data and cyber	5. Environment and biodiversity crises	6. Legislation, policy and regulation	7. Existing assets and new approaches to service delivery
Biodiversity, relevance: H-high / M-medium/ L -Low	H	M	M	M	H	H	H

C.6 Fisheries

The waters around Ireland contain some of the most productive fishing grounds and biologically sensitive areas in the EU (Marine Institute, 2022)⁴⁷. Sea-fishing is managed by the EU under the Common Fisheries Policy (including in-shore fishing). In Ireland, in-shore fishing is considered to be the fishing of non-quota fish stocks by sea-fishing boats less than 12m in overall length within 6 nautical miles of the Irish coast. Such fishing is managed by the Minister for Agriculture, Food and the Marine.

Inland Fisheries Ireland (IFI) is the Agency that has the statutory responsibility for the protection, development, and management of inland fishing, including rivers, streams and lakes . A coastal 12-mile jurisdictional limit is also included (IFI, 2023)⁴⁸.

⁴⁷ Marine Institute. 2022. Fisheries Overview. Accessed: 04.08.2023. Available from: <https://www.marine.ie/site-area/areas-activity/fisheries-ecosystems/fisheries-overview>

⁴⁸ IFI. 2023. *Inland Fisheries Ireland*. Accessed: 04.08.2023. Available from: <https://www.fisheriesireland.ie/#:~:text=Inland%20Fisheries%20Ireland%20is%20the,jurisdictional%20limit%20is%20also%20included.>

C.6.1 Fisheries Baseline Condition

The Irish seafood industry brings in an estimated €1.3 billion in GDP and employs 8,218 individuals directly through fisheries, aquaculture and fish processing (BIM, 2023a)⁴⁹.

Water quality is a growing concern for all aquaculture businesses with poor water quality leading to increased costs for depuration processes before sale, and the potential introduction of invasive species and pathogenic organisms, with businesses requiring the importation of non-native juvenile stock becoming increasingly concerned about seed survival and the potential impact for future sales (BIM, 2023b)⁵⁰.

Fisheries

According to EU “Fisheries and aquaculture production” data, in 2019 the total catches of Ireland represent 4.94% of total EU catches with 238,439 tonnes live weight. The main species caught were Atlantic mackerel 53,490 tonnes live weight (22.40%), Blue whiting 38,569 tonnes live weight (16.20%), Atlantic horse mackerel 28,899 tonnes live weight (12.10%), North Atlantic rockweed 28,000 tonnes live weight (11.70%) and European sprat 13,012 tonnes live weight (5.50%) (IFI, 2023).

Fish Landing

According to CSO Fish Landings 2022⁵¹ statistics, landings by Irish vessels in Ireland and foreign ports decreased by 15% between 2021 and 2022, landings by Irish vessels in Ireland fell by 3%, Killybegs had the highest quantity of fish landings in 2022 accounting for 65% of landings by Irish vessels in Ireland, and landings by foreign vessels in in Irish ports accounted for 41% of total landings in Ireland.

In 2022, the species with the highest quantity landed by Irish vessels in Ireland was Atlantic Mackerel at 46,131 tonnes, which was 29% of Irish landings in Ireland. Table C.12 below shows the fish landings quantities in Ireland and Abroad for the period 2013-2023 (CSO, 2023).

Table C.12 Fish Landings in Ireland and Abroad 2013-2022

Tonnes (Live weight equivalent)				
Year	Irish Vessels			Foreign Vessels in Ireland
	Ireland	Foreign Ports	Total	
2013	202,926	76,943	279,869	27%
2014	220,344	74,039	294,383	25%
2015	204,194	93,938	298,132	32%
2016	207,620	68,012	275,632	25%
2017	213,501	100,305	313,806	32%
2018	184,375	132,477	316,852	42%
2019	173,922	103,386	277,308	37%
2020	188,051	136,257	324,308	42%
2021	181,792	116,719	298,511	39%

⁴⁹ <https://bim.ie/wp-content/uploads/2023/04/BIM-The-Business-of-Seafood-2022.pdf>

⁵⁰ <https://bim.ie/publications/aquaculture/>

⁵¹ CSO. 2023. *Fish Landings 2023*. Accessed: 26.11.2023. Available from: <https://www.cso.ie/en/releasesandpublications/ep/p-fl/fishlandings2022/#:~:text=Landings%20by%20Irish%20vessels%20in%20Irish%20and%20foreign%20ports%20fell,by%2024%25%20or%205%2C770%20tonnes>

Tonnes (Live weight equivalent)				
Year	Irish Vessels			Foreign Vessels in Ireland
	Ireland	Foreign Ports	Total	
2022	156,943	110,259	267,202	41%

Aquaculture

Aquaculture production in Ireland in 2019 was 34,977 tonnes live weight representing 2.56% of total EU production. The main species produced in aquaculture facilities were Atlantic salmon 11,333 tonnes live weight (32%), Pacific cupped oyster 7,554 tonnes live weight (22%) and Blue mussel 15,184 tonnes live weight (43%) (IFI, 2023).

Shellfish Waters

There are 63 shellfish waters in Ireland which are protected areas designated to support the life and growth of shellfish such as oysters, mussels and clams (EPA, 2022c)⁵². Shellfish Water Protected Areas now come under the protected areas covered under the WFD. Inadequately treated wastewater discharges have potential to contaminate shellfish with bacteria and viruses which in turn poses risk to human health through the consumption of the shellfish. The EPA has identified that Uisce Éireann must complete an assessment of the impacts of wastewater discharges on 24 of the designated shellfish waters.

Shellfish waters in Ireland are presented in Figure C.20.

C.6.2 Fisheries Baseline Condition

Fresh Water Fishing

Fresh water fishing in Ireland is represented by mainly recreational fishing. Main type of recreational fishing in Ireland are represented by fishing for trout, pike, salmon and coarse fishing.

IFI (2023) note that brown trout thrive in most waters and as such are found well spread over most of Ireland. In many areas fisheries are specifically managed for them; however, they are also found in waters containing large stocks of pike and coarse fish. The Atlantic Salmon (“Bradán” in Gaelic) is a native Irish fish. Most rivers get a run of salmon from Spring until Autumn. Salmon can be caught in Irish waters from January through to October.

Coarse fishing in Ireland is a year-round activity. According to the IFI (2023), fish feeding throughout the year, particularly roach and perch, can be fished all year round. Species such as tench, bream and rudd, which are most active in warmer weather, have a natural season extending from April to October. The influence of the Irish climate, as well as the habits of the fish, has to be taken into account when targeting particular species. Most Irish rivers and loughs are subject to seasonal rhythms of high and low water and can be adversely affected by floods and droughts.

C.6.3 Future Trends

Following the adoption of the Partnership Agreement 2021-2027 with Ireland, the European Commission has adopted the European Maritime, Fisheries and Aquaculture Fund programme for Ireland, to implement the EU CFP and EU policy priorities outlined in the European Green Deal.

⁵² EPA. 2022c. *Urban Waste Water Treatment in 2021*. Accessed: 25.08.2023. Available from: <https://www.epa.ie/publications/monitoring--assessment/waste-water/uww-report-2021.php>

The programme aims to boost the resilience of the entire seafood sector, to accelerate its green transition, as well as to support the coastal communities (Directorate-General for Maritime Affairs and Fisheries, 2022)⁵³. 50% of the programme allocation will be dedicated to sustainable fisheries and conservation of aquatic biological resources, 36% will be invested in sustainable aquaculture and in processing and marketing, 6% will be dedicated to sustainable blue economy in coastal areas and 2% will be invested in the strengthening of international ocean governance.

C.6.4 Key Considerations for WSSP 2050 and the SEA

The key challenges and opportunities in relation to Fishing and Angling are:

Challenges

- Potential for the operation of wastewater treatment plants to affect freshwater or estuarine or marine water quality, fish stock and related livelihoods or recreation and tourism;
- Potential for changes to hydrology which could impact coastal processes that are particularly important for shellfish and aquaculture habitats;
- Potential for the operation of wastewater treatment plants to affect shellfish, related livelihoods and human health; and
- Potential for construction works to affect water quality, fish stock and related livelihoods or recreation and tourism.

Opportunities

- Opportunities for contributing to improvements in water quality and resources through better wastewater treatment and sustainable abstraction and potential to reduce barriers to fish migration.

Table C.13 illustrates the links between this SEA topic and the WSSP 2050 issues presented in the Draft WSSP 2050.

Table C.13 SEA Topic links with the Draft WSSP 2050

WSSP Draft WSSP 2050 – issues	1. Climate change	2. Awareness and behaviours	3. Circular economy	4. Digitisation, data and cyber	5. Environment and biodiversity crises	6. Legislation, policy and regulation	7. Existing assets and new approaches to service delivery
Fisheries & Angling relevance: H - high/M - medium/ L - Low	H	H	M	M	H	M	H

⁵³ Directorate-General for Maritime Affairs and Fisheries. 2022. *Ireland will receive €142 million from the European Maritime, Fisheries and Aquaculture Fund 2021-2027*. Accessed: 27.06.2023. Available from: https://oceans-and-fisheries.ec.europa.eu/news/ireland-will-receive-eu142-million-european-maritime-fisheries-and-aquaculture-fund-2021-2027-2022-12-09_en

C.7 Material Assets

SEA legislation includes “material assets” as a topic to be addressed in the SEA. However, it does not clearly define what this topic includes. For the purpose of this report, Material Assets are considered to be the natural and built assets (non-cultural assets) and resources required to enable society to function as a place to live and work, in giving them intrinsic, economic value.

C.7.1 Material Assets Baseline Condition

Material assets considered here include:

- Land use/natural material assets resources which include agricultural land, peatlands and forestry (see also geology and soils topic);
- Built assets - include infrastructure relating to public open spaces and buildings, schools, healthcare facilities, residential and social buildings such as housing, and infrastructural networks such as electricity, gas, transport with emphasis on water supply and wastewater infrastructure and management as most relevant; and
- Waste management - an aspect of resource management and an important part of the circular economy.

These assets all need to be considered in new water services, resource planning and infrastructure development.

C.7.2 Land Use (Natural Assets)

The land use in Ireland in 2018 was composed predominantly of grassland, swamp and saltmarsh; followed by forest, woodland and scrub. See Table C.14 for a national breakdown of land cover in Ireland (EPA, 2018a)⁵⁴.

Table C.14 Total area in hectares (ha) and percentage of national area by Level 1 group for National Land Cover 2018 (EPA, 2018a) (EPA/OSI⁵⁵ data accessed 2023)

Category	Category total area (ha)	Category total area (%)
Artificial Surfaces	268,016	3.79
Exposed Surfaces	133,270	1.89
Cultivated Land	427,033	6.05
Forest, Woodland And Scrub	1,290,757	18.27
Grassland, Swamp And Saltmarsh	3,828,161	54.20
Peatland	462,292	6.55
Heath And Bracken	456,917	6.47
Waterbodies	196,800	2.79

⁵⁴ EPA. 2018a. *National Land Cover Map 2018 - Final Report*. Accessed: 25.07.2023. Available from:

<https://www.tailte.ie/surveying/products/professional-mapping/national-land-cover-map/national-land-cover-map-v3-2.pdf>

⁵⁵ Effective from March 1st, 2023, Ordnance Survey Ireland (OSI), the Property Registration Authority (PRA), and the Valuation Office (VO) have been amalgamated to establish Tailte Éireann.

Grassland, swamp and saltmarsh is the most widespread land cover class across the country and is dominated by the subsection ‘Improved Grassland’ (41.53% of national area), followed by ‘Wet Grassland’ (9.47%). The forest, woodland and scrub land cover class is most prominent in the east of Ireland in the counties of Wicklow, Leitrim and Clare. Cultivated land is more prominent in the east and south of the country in the counties of Louth, Wexford and Carlow. The ‘Peatland’ land cover class is distributed primarily to the north-east and south of Ireland and the counties of Donegal and Kerry have significant areas of the ‘Heath and Bracken’ land cover class. The distribution of the main associated sub-classes of land cover in Ireland is presented in Figure C.19 below.

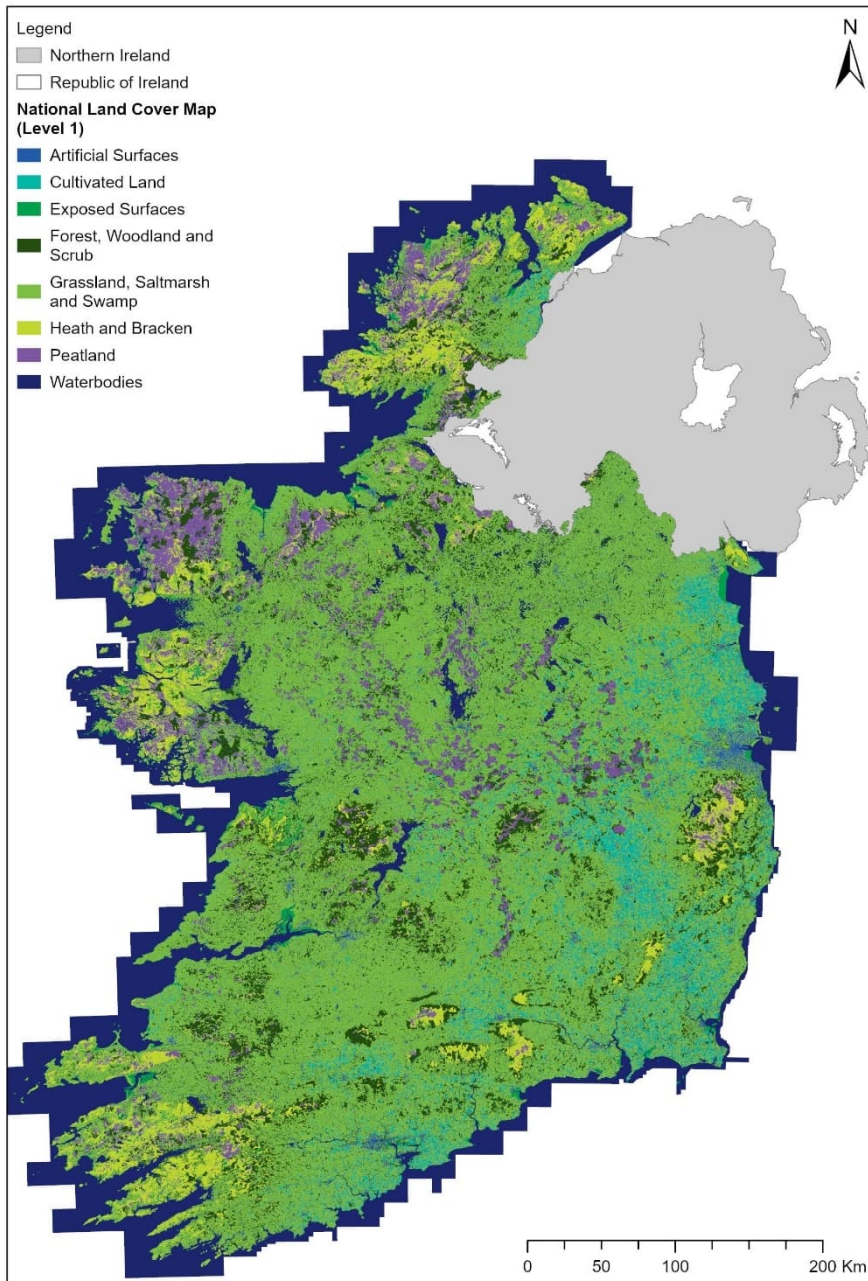


Figure C.19 National Land Cover (EPA, 2018a - data accessed 2023)

Changes in Land Use and Land Cover

Agriculture has been the dominant land cover type since 2012 at 67.6 %. There has been a small decrease since 2012 and a downward trend overall has presented since 1990 with the main change being a shift from

agriculture to forestry and artificial areas. There has also been a moderate decrease in wetlands since 2012, and since 1990 there has been a 20 % reduction, with a loss of 258,800ha. The primary transition for the wetlands land cover has been to forestry and the re-mapping of intertidal flats (EPA, 2020a).

Artificial areas have increased significantly since 1990 by 65%. These changes have mainly impacted on losses in agricultural areas, with some smaller losses in forestry and wetland areas. However, there has also been a general upward trend in forestry since 1990 with most of this growth being attributed to commercial coniferous plantations (EPA, 2020a).

C.7.3 Built Material Assets

Settlements

Dublin city and suburbs is the largest settlement in Ireland with a population of 1,458,154 in 2022. This is followed by the cities and suburbs of Cork (population of 584,156), Galway (277,737), Kildare (247,774), and Meath (220,826) (CSO, 2023a). Across the country, these cities are the most urbanised areas. Overall, the urban population accounted for 63.91% of the total population of Ireland in 2021.

National Infrastructure

There are five “Ports of National Significance” in Ireland: Dublin Port, Shannon Foynes, Port of Cork, Rosslare and Port of Waterford. There are also four “Ports of Regional Significance”: Bantry Bay, Drogheda, Galway and Greenore. There are also three main airports (Dublin, Cork and Shannon) and a number of regional airports, including Donegal, Galway, Kerry, Knock, Sligo and Waterford. Other significant transport infrastructure includes 100,000km of road network and 2,400km of railway.

Ireland’s canals once played a significant role as a transport network. However, they are now mainly used for recreational and heritage purposes. Key canals are the Grand Canal, Royal Canal, Boyne Canal and Shannon-erne Waterway.

In Ireland, hydroelectric power plants make good use of water infrastructure to generate electricity. The most common type of hydroelectric power plant uses a dam across a river to release the reservoir flow through a turbine. The biggest in Ireland are Ardnacrusha on the River Shannon, Ballyshannon on the River Erne and Poulaphouca on Blessington Lake.

Water Supply Infrastructure

Uisce Éireann’s water infrastructure is ageing and needs significant maintenance and/or replacement of assets in order to continue to deliver its service. A large proportion of the water infrastructure in Ireland was installed decades ago and requires repair, replacement, or upgrade. For example, the average age of water mains in Ireland is between 65 and 85 years old, compared to 36 years in the EU⁵⁶. In addition, the cast iron mains in Ireland’s cities and towns are often heavily corroded and vary in age from 50 to 160 years, giving rise to high leakage, rust discolouration and high risk of failure causing supply disruption. Other pipe materials such as uPVC and Asbestos Cement laid between the 1960s and 1980s can also be problematic with high burst frequency.

Uisce Éireann’s current infrastructure includes approximately 50,726 km of pipeline, 706 WTPs, and 1,016 abstractions. The Water Treatment Plants (WTPs) feed water into supply areas known as Water Resource Zones (WRZs). Each WRZ is an independent water supply system serving a region, town or village. There are currently 539 WRZs in the Republic of Ireland.

⁵⁶ Irish Water. 2021a. *Irish Water Business Plan*. Accessed: 04.07.2023. Available from: <https://www.water.ie/docs/Irish-Water-Business-Plan.pdf>

Uisce Éireann have invested in a range of water projects and programmes that will support and enable proper planning and sustainable development at a National, Regional and Local level. Water capacity and resilience has been improved by constructing or upgrading a total of 70 water treatment plants since 2014, with 6 of these completed in 2022. A total of 315km of new or rehabilitated watermain was laid in 2022.

Uisce Éireann are delivering a range of national programmes to address at risk water infrastructure. The national programmes are currently being delivered as part of Uisce Éireann's regulated Capital Investment Plan 2020-2024. However, due to the condition of the existing asset base and the large number of sites to be addressed, it may take several investment cycles before Uisce Éireann have the appropriate risk controls in place across all their infrastructure and supplies.

Wastewater Infrastructure

The European Union's Urban Wastewater Treatment Directive sets standards for treating wastewater at all large urban areas (large urban areas are towns and cities with a population equivalent of at least 2,000 that discharge effluent to freshwater or estuaries, and areas with a population equivalent of at least 10,000 that discharge effluent to coastal waters), with the objective of protecting the environment from the harmful effects of wastewater discharges. The final deadline to meet the standards was 2005 and Ireland's performance in 2021 is summarised below from 2017 to 2021:

- 174 large urban areas in Ireland were subject to the EU wastewater treatment standards;
- 162 areas complied with the standards; and
- 12 areas failed to comply with the standards.

Almost half of Ireland's urban wastewater is generated in the 12 areas that failed the standards (EPA, 2021c)⁵⁷. Most of this is produced in the greater Dublin area and conveyed to the overloaded treatment plant at Ringsend, which does not provide a sufficient level of treatment. Consequently, just 51% of the wastewater from Ireland's large urban areas was treated to European Union standards in 2021. This is well below the European average of 90% (EPA, 2021c). A €500 million upgrade of Ringsend treatment plant to increase treatment capacity and bring it up to EU standards is ongoing and due to be completed in 2025.

Since the start of 2014, Uisce Eireann has constructed or upgraded 125 wastewater treatment plants including 9 of these in 2022.

Clonakilty and Kinsale in Cork and Ballymote in Sligo are served by wastewater treatment plants that have the capacity to meet the treatment standards and they are reported as having met these standards in 2020; however, they failed to meet standards in 2021 (EPA, 2021c). There are also three areas that failed the standards in 2020 but passed them in 2021, namely, Cork City, Shannon and Ennis South in County Clare. This was as a result of upgrades to the treatment plants serving Cork City and Shannon that delivered improvements in effluent quality and improvements in the operation and management of the plant for Ennis South (EPA, 2021c).

Thirty small towns and villages and two large urban areas (Arklow and Merville) discharge raw sewage into seas and rivers because they are not connected to wastewater treatment plants as of mid-2022. The number of towns and villages discharging raw sewage on a daily basis reduced by 18 between 2014-2021 (EPA, 2021c). These included Castletownbere and Cobh in County Cork in 2021.

Based on Uisce Eireann's latest plans the EPA report notes that:

- Raw sewage discharges from 19 areas will cease by the end of 2024;

⁵⁷ EPA. 2021c. *Urban Waste Water Treatment in 2021*. Accessed: 25.07.23. Available from: <https://www.epa.ie/publications/monitoring--assessment/waste-water/Urban-Waste-Water-Treatment-in-2021-report.pdf>

- A further 11 areas are scheduled to be connected to treatment plants in 2025; and
- The final two areas are expected to receive treatment in 2027.

Ireland's draft 3rd cycle RBMP (2022-2027) published 2021 identified wastewater discharges as a significant pollution pressure on 208 waterbodies (DHLGH, 2021c). This is down from 291 waterbodies in the second cycle RBMP (2018-2021) (DHLGH, 2018). Most of the affected waterbodies are sections of rivers.

Wastewater Collecting Systems

Ireland has an estimated 26,000 kilometres of public sewers and around 2,200 public wastewater pumping stations. These collect the sewage generated in our communities and convey it to treatment plants. Many sewers also collect rainwater runoff from impermeable surfaces such as roads.

Collecting systems (sewers and pumping stations) should have enough capacity to collect and retain wastewater during all normal weather conditions and all normal seasonal variations in wastewater load. Many collecting systems are currently unable to cope with capacity and release wastewater into the environment before it can reach the treatment plants. A total of 102km of new or rehabilitated sewer network was laid during 2022.

In 2019 the Court of Justice of the European Union declared that Ireland failed to ensure wastewater collected from eight large urban areas was retained and conveyed for treatment. The collecting systems serving two of these areas (Ringaskiddy-Crosshaven-Carrigaline and Enniscorthy) have been upgraded to resolve the issues raised by the Court. Collecting systems serving six of these areas are scheduled to be upgraded to bring them up to standard. Four are due to be upgraded between 2023-2025 (Fermoy, Mallow, Roscommon and Athlone) and the other two, Midleton and Cork City, are scheduled to be completed in 2029 and 2030 respectively.

Storm Water Overflows

There are an estimated 2,350 overflow outlets, referred to as storm water overflows, in Ireland's wastewater collecting systems. Uisce Éireann has limited information regarding discharges of untreated wastewater through these outlets. To rectify this, Uisce Éireann is assessing its storm water overflow outlets against national standards. As of the end of 2021 Uisce Éireann have assessed almost three-quarters (1,735) of its storm water overflow outlets. Over 400 of these will require improvements (EPA, 2021c). Uisce Éireann are also installing monitoring equipment to measure how often and for how long wastewater is discharged through storm water overflow outlets. This equipment has been installed on one-third (790) of the overflow outlets as of the end of 2021 (EPA, 2021c).

C.7.4 Waste Management

Ireland's waste management landscape changed radically with the implementation of the Waste Management Act in 1996. From a low base, the country made great strides in reducing disposal to landfill, providing an infrastructure for the collection of recyclables and developing expertise in waste management, regulation, research and innovation. Ireland showed innovation by being the first country to introduce a plastic bag tax and to launch a National Waste Prevention Programme. However, Ireland has reached a plateau in relation to waste management; to further deliver the necessary waste prevention and circular economy ambitions will be a challenge.

The latest data highlights the need for Ireland to do more to prevent waste, improve recycling, increase self-sufficiency and move towards a more integrated approach to waste management, as part of implementation of the new national waste policy, the EU Circular Economy Package and the European Green Deal.

The latest waste statistics (EPA, 2020b)⁵⁸ indicate that waste generation is increasing in many waste streams. Construction and demolition waste is the largest waste stream in Ireland in 2020 (over 8.2 million tonnes). Ireland generated approximately 16.2 million tonnes of waste in 2020, corresponding to 3.25 tonnes per person, up from 12.7 million tonnes (2.77 tonnes per person) in 2012. Although, the amount of municipal waste recycled has increased by 11% since 2016, total waste generated has also increased by 11%.

Ireland missed the waste electrical and electronic equipment (WEEE) collection target in 2020 and is in danger of missing future EU waste targets for municipal and plastic packaging waste recycling. Ireland is still heavily reliant on export markets, particularly for the treatment of municipal waste, hazardous waste, packaging waste, WEEE and biowastes.

Wastewater Treatment Sludge

Sewage sludge is a by-product of wastewater treatment. The Urban Wastewater Treatment Directive requires sewage sludge to be reused whenever appropriate. Good sludge management, such as removing sludge from a treatment plant at an appropriate rate, is an essential part of the treatment process. Uisce Éireann removed 60,467 tonnes of sewage sludge from its treatment plants in 2021 (EPA, 2021c). Sludge contains valuable nutrients such as nitrogen and phosphorus and most of this was subsequently reused as a fertiliser or soil improver on agricultural land (55,182 tonnes), with the rest used for composting (5,154 tonnes) and placed in storage at the end of 2021 awaiting land spreading on soil/agricultural land in 2022 (131 tonnes).

Uisce Éireann is progressing a number of initiatives through the water treatment plant residual strategy taking a circular economy model for the management of sludges, as they provide a sustainable source of precious finite materials. The sludge provides an alternative/complement to current raw materials being used. We view water sludge as a valuable resource particularly in the context of the circular economy model. This model is in direct contrast to the current linear model of 'take, make, consume, dispose', with landfill being the primary end point. Uisce Éireann are progressing a number of potential sustainable options. Recovery/reuse of the sludge is the preferred long term sustainable option for Uisce Éireann. A key milestone has been reached with nearly 90% of water treatment sludge going to circular economy outlets.

Uisce Éireann is currently involved in a number of innovative projects, funded by the Water Services Innovation Fund administered by the Commission for Regulation of Utilities and will deliver benefits for our customers, the environment and the economy. These projects include enhancing existing wastewater treatment plants through aerobic granular sludge addition and developing pilot sludge treatment reed beds for use in treating and de-watering water sludge containing aluminium sulphate.

Locations identified by the EPA, where river waterbody ecological status is considered to be under pressure due to abstractions and urban wastewater discharges are presented in Figure C.20.

⁵⁸ EPA. 2020b. *National Waste Statistics 2020 Summary Report for 2020*. Accessed: 25.07.23. Available from: https://www.epa.ie/media/epa-2020/publications/monitoring-amp-assessment/waste/EPA_National_Waste_Stats_Summary_Report_2020.pdf

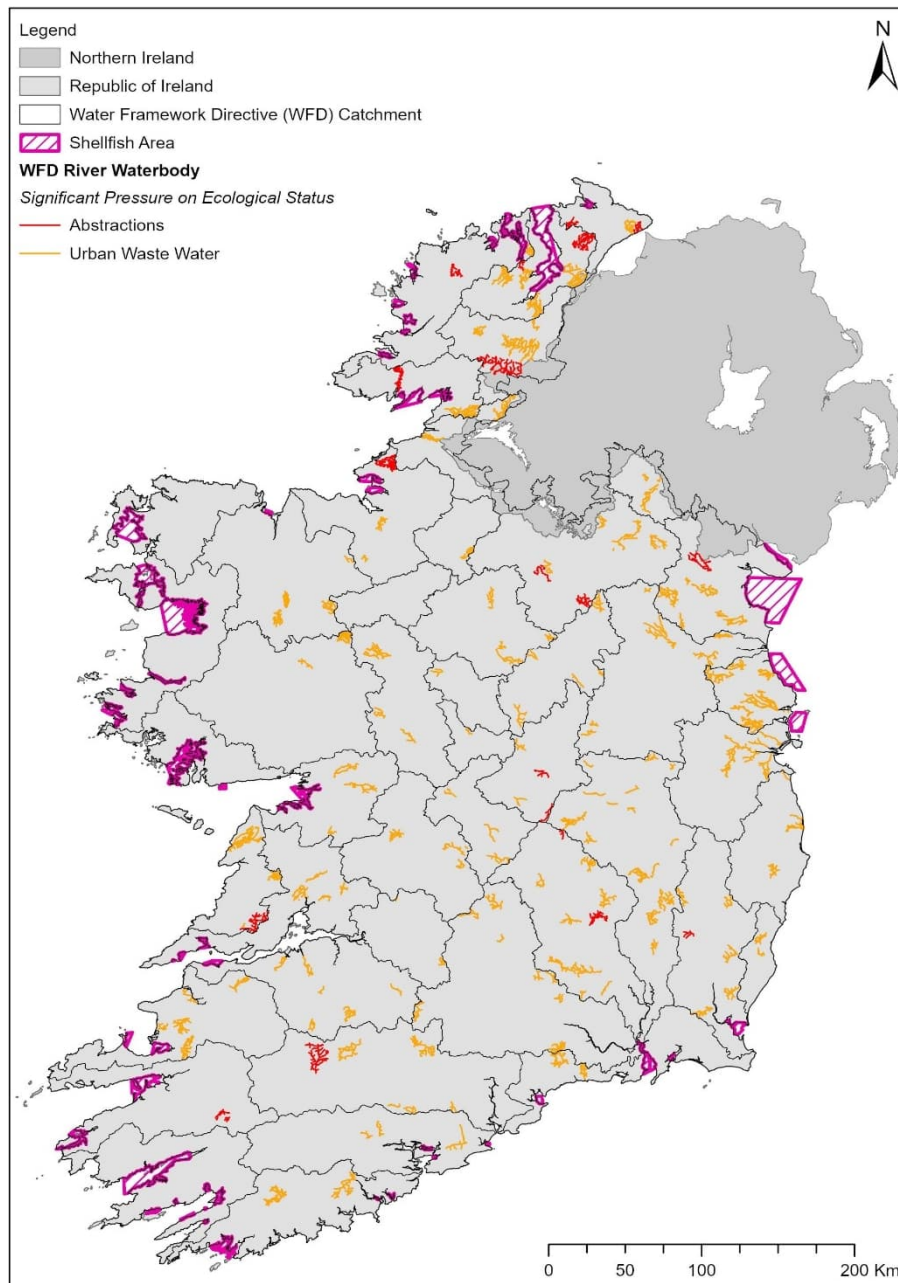


Figure C.20 Abstractions and urban wastewater discharges - significant pressures for river waterbodies^{59,60}

The EPA reports that there are deficiencies in many public sewers and wastewater treatment plants, meaning that wastewater from some areas discharges into the environment without adequate treatment. EPA identified priority areas in their 'Urban Waste Water Treatment in 2021' report (EPA, 2022c):

- Comply with EU treatment standards by improving treatment at 12 large urban areas which did not comply with EU standards;
- Eliminate raw sewage discharges from 32 towns and villages which discharge raw sewage into the seas and rivers every day;

⁵⁹ EPA. 2022d. *WFD Significant pressures*. Accessed 15.08.2023. Available from: <https://gis.epa.ie/GetData/Download>

⁶⁰ DHLGH. 2017. *Shellfish Waters Directive Areas*. Accessed 01.08.2023. Available from: <https://data.gov.ie/dataset/shellfish-waters-directive-areas>

- Improve collecting systems (sewers) at six areas to make sure the waste water they collect is retained and conveyed for treatment to protect the environment and address a 2019 judgement from the Court of Justice of the European Union;
- Prevent pollution of inland and coastal waters at 38 areas where improvements are most needed to protect inland and coastal waters adversely impacted by wastewater discharges; and
- Protect vulnerable habitats at 12 towns and villages where treatment must improve to protect endangered freshwater pearl mussels.

The number of priority areas where treatment needs to improve has decreased from 148 in 2017 to 89 in July 2023.

C.7.5 Future Trends

Natural Assets/Land Use

In the EPA “Land Use Review: Fluxes, Scenarios and Capacity Synthesis Report” different scenarios were developed and assessed regarding their capacity to facilitate net-zero GHG emissions from the agriculture, forestry and other land use (AFOLU) sector in Ireland by 2050 (EPA, 2023e).

The scenarios include large changes in land use at the national level targeted at achieving net-zero emissions. Many of the land use changes required for net-zero emissions identified are not in line with current land use policy targets as follows:

- Afforestation – current policy targets are approximately 8000 ha yr⁻¹. This level is much smaller than the rates compatible with meeting net-zero targets (20,000-35,000 ha yr⁻¹) depending on whether CH₄ is included in the targets;
- Wetlands – the peatland restoration targets outlined in policy documents ranged from 33,000ha for exploited peatlands to 80,000ha for drained organic soils under grasslands. These fall short of the 70,000ha for exploited peatlands and 302,000ha for drained organic soils under grasslands that would be compatible with meeting net-zero targets;
- Agriculture optimisation – improving the efficiency of agricultural production and so lowering the emissions intensity associated per unit of food output is a central target of many actions in the Ag Climatise Plan. Policy analysis did not find any specific targets in relation to reductions in ruminant livestock numbers; and
- Biodiversity – target of allocating 10% of space for nature most closely agrees with key national and EU policies.

Built Material Assets

The general trend of increasing urbanisation is expected to continue (DPER, 2021). Large urban centres and hubs are expected to continue growing in significance as part of regional spatial development. Service efficiencies and the provision of infrastructure will improve and become increasingly sustainable as urban centres continue to grow. However, rural areas also make a strong contribution to the Irish economy and sense of character, so efforts to maintain rural communities are necessary to benefit the wider regions.

Uisce Éireann RBMP Enhanced Ambition Programme is funded by the European Union under Ireland's National Recovery and Resilience Plan. This is a significant investment which will support the objectives of Ireland's RBMPs and improve water quality in rivers. The programme is aimed at ensuring that Uisce Éireann assets are not impacting on the ability of receiving waters to achieve their water quality objectives. The programme involves:

- The upgrade of 10 Wastewater Treatment Plants (WWTPs);
- Completing feasibility studies for 25 WWTPs; and
- Undertaking effluent and water quality assessments to quantify improvements needed at these WWTPs.

The WWTPs selected for inclusion in the programme have all been identified in Ireland's draft RBMP for Ireland 2022-2027 as causing water quality impacts in the rivers they discharge to.

Waste and the Circular Economy

The Circular Economy and Miscellaneous Provisions Act (2022), underpins Ireland's shift from a 'take-make-waste' linear model to a more sustainable pattern of production and consumption, that retains the value of resources in the economy for as long as possible and that will significantly reduce the nation's greenhouse gas emissions. The 2022 Whole of Government Circular Economy Strategy provides the policy framework for the circular economy in the country and Ireland's National Waste Policy 2020-2025, A Waste Action Plan for a Circular Economy (DECC, 2020)⁶¹, sets out a roadmap that aims to ensure that Ireland not only meets the legal targets but also takes full advantage of the opportunities of the circular economy.

The new legislation and strategies strengthen the approach to addressing waste and implementing circular economy principles. Nevertheless, with a circularity material use rate of 2% in 2020, Ireland has significant scope for progress (OECD, 2022)⁶².

The development of circular economy principles will impact all sectors of society and collaboration between stakeholders will be key to this transition in Ireland. Some examples of how the water sector may be changed by the progressive adoption of circular economy principles include:

- Encouraging the efficient use of water, through technologies such as leak detection systems or smart water meters, will reduce water leakage and present new opportunities to manage water use, thereby mitigating some of the impacts on freshwater sources.
- Reusing wastewater in sectors such as agriculture and manufacturing can decrease Ireland's dependence on freshwater sources. There is also potential for re-use for drinking water when treated to the appropriate standards. In addition, rainwater harvesting, and stormwater management can provide alternative sources of water for non-potable use such as toilet flushing or irrigation. Reusing wastewater can also contribute to reducing the impact of flooding and improving water quality.
- Nutrient recovery systems can extract valuable resources from wastewater sludge, for example by converting nutrients to fertilisers or energy. This can contribute to reducing nutrient pollution, potentially reducing treatment requirements for water abstracted from rivers. Sustainable agricultural practices will also support this trend.
- Minimising use of consumables in the delivery of water and wastewater services and generating renewable electricity.

There are several challenges to overcome to maximise the opportunities associated with circular economy principles, in particular water and wastewater reuse. These include public perception, regulatory challenges and market failures linked to the cost of reused water (EPA,2019)⁶³.

⁶¹ DECC. 2020. A Waste Action Plan for a Circular Economy. Accessed: 20.07.23. Available from: <https://www.gov.ie/en/publication/4221c-waste-action-plan-for-a-circular-economy/>

⁶² OECD. 2022. *OECD Economic Surveys: Ireland 2022*. Accessed: 22.06.23. Available from: <https://www.oecd-ilibrary.org/ireland>

⁶³ EPA. 2019. *Water Reuse in the Context of the Circular Economy*. Accessed 20.07.23. Available from https://www.epa.ie/publications/research/water/Research_Report_293.pdf

Relevant to these challenges are the limitations on landfill capacity. According to the EPA (2020b), two of the three operational municipal landfills will approach their maximum lifetime consented capacity by 2027 if additional capacity is not authorised. There is a risk in the event of export markets closing at short notice and the planned contingency landfill capacity needs to be secured without delay. Treating waste as close to its source as possible (the proximity principle) is one of the core pillars of EU waste policy. Waste exports also represent missing valuable opportunities to maximise the beneficial and efficient use of waste materials. By addressing waste infrastructure deficits, Ireland can develop circular economy opportunities and reduce the emissions associated with transporting waste over long distances.

C.7.6 Key Considerations for WSSP 2050 and the SEA

Key challenges and opportunities in relation to the material assets topic are:

Challenges

- Land management: agricultural practices can contribute to the release of nutrients and fertilisers into waterbodies, causing eutrophication (the gradual increase in the concentration of phosphorus, nitrogen, and other plant nutrients in an aquatic ecosystem). Wastewater sludge spreading can also contribute to this.
- Resilience of infrastructure and operations – Uisce Éireann’s asset base will have to cope with the various impacts of climate change, and support growth.

Opportunities

- Programmes to support and raise awareness on sustainable land management practices to reduce run off can reduce pollution. Measures can include changing timing of fertilizer application, cover crops, soil erosion control and creating/ preserving riparian buffers which can be low-cost effective land management measures to protect waters. Provisions under the new Drinking Water Regulation include Drinking Water Safety Plans and Catchment Management Plans - these can identify actions to address potential source pollution.
- Land use and habitat type are the basis for natural capital and ecosystem services with links across topics including biodiversity, carbon, water, food production, fisheries and recreational uses.
- Waste management and potential to contribute to the circular economy - promoting sustainable waste disposal and minimising release of industry pollutants into water sources can benefit the environment, reduce carbon and reduce treatment costs.
- Awareness of the impacts of sewer misuse can also lead to customer action (for example, not flushing wet wipes).

Table C.15 illustrates the links between this SEA topic and the WSSP 2050 issues presented in the Draft WSSP 2050.

Table C.15 SEA Topic links with the Draft WSSP 2050

WSSP Draft WSSP 2050 – issues	1. Climate change	2. Awareness and behaviours	3. Circular economy	4. Digitisation, data and cyber	5. Environment and biodiversity crises	6. Legislation, policy and regulation	7. Existing assets and new approaches to service delivery
Material assets relevance: H - high/M - medium/L - Low	H	M	H	M	H	M	H

C.8 Landscape, Townscape and Seascape

C.8.1 Landscape Baseline Condition

Landscapes reflect many variables, including underlying geology, soils, topography, land cover including habitats and agricultural, forestry and urban land, hydrology, historic and cultural development, and climate. These physical and socio-economic influences, and interrelationships, makes one landscape different from another. Landscape character is the distinct and recognisable pattern of elements, or characteristics, in the landscape that make these differences. Landscape features such as hedgerows field boundaries, woodlands, riparian corridors, canals and wetlands are part of landscape character and are also important as ecological corridors providing connectivity but can be especially vulnerable to linear infrastructure development.

The European Landscape Convention (ELC) is the first international treaty to focus solely on landscape. The Convention promotes the protection, management and planning of European landscapes. The Irish Government ratified the Convention in 2002. The National Landscape Strategy 2015-2025⁶⁴ was put in place to drive compliance with the European Landscape Convention by establishing principles that provide the high-level policy framework to achieve the Convention’s objectives.

There is currently no published national level landscape mapping for Ireland. There is also no national classification system for landscape character areas (LCAs), as these are geographically specific and have their own distinctive character based on their location and surrounding environment. However, the National Planning Framework⁶⁵ committed to developing guidance on local landscape character assessments (including historic landscape characterisation), to provide for a more consistent landscape character assessment approach across administrative boundaries. The Marine Institute has also developed a Seascape Character Assessment. Regionally, the regional spatial and economic strategies will help coordinate local authority landscape character assessments.

In accordance with the Planning and Development Act 2000 (as amended), all local authorities need to identify Landscape Character Areas (LCAs) within their Development Plans to ensure that defining features are protected and managed. Although some local authorities have yet to formally document LCAs, many have incorporated landscape designation into their Development Plans. For example, in the form of protected views, prospects, landscape conservation areas and scenic routes. Similar to the LCAs, there is no national standardised approach for designating these landscape features/sites.

⁶⁴ DAHG. 2021. *National Landscape Strategy for Ireland 2015-2025*. Accessed: 04.08.2023. Available from: <https://www.gov.ie/en/publication/8a59b-national-landscape-strategy/>

⁶⁵ DHPLG. 2018. *Project Ireland 2040: National Planning Framework*. Accessed: 04.08.2023. Available from: <https://www.npf.ie/>

The landscape of Ireland is varied with a mix of lowland and upland, rivers, lakes and shores. The majority of uplands in Ireland are close to the coast. There are 45 peaks which exceed 750m and which are within 56km from the coast. However, most of the landmass of Ireland, particularly the centre, is low-lying land. Less than 5% of the total landmass lies above 500m and over 80% is below 200m.

According to the NPWS (2021) there are six National Parks in Ireland, five of which are located on the western coast. National Parks can be designated for a range of reasons, one of which is containing natural landscapes of great beauty. The six National Parks are:

- Ballycroy – 11,000 hectares of Atlantic blanket bog and mountainous, unspoilt wilderness;
- The Burren – a rocky limestone outcrop and grassland covering 1,500 hectares;
- Connemara – 3,000 hectares of scenic mountains, expanses of bogs, heaths, grasslands and woodlands;
- Glenveagh – an area of wilderness and forest in the Derryveagh Mountains, encompassing 16,000 hectares;
- Killarney – a 10,000-hectare expanse of rugged mountainous country, including lakes, woods and Ireland's highest mountain range; and
- Wicklow Mountains – a mountain range extending across 20,000 hectares of County Wicklow on the eastern coast of Ireland.

There are also Areas of Special Amenity which are designated according to their outstanding natural beauty for special recreational value. These sites include the Liffey Valley, North Bull Island and Howth Head. More broadly, areas which can be most sensitive to visual impacts include:

- Lands with an elevation of >200m;
- Forestry areas;
- Lands with a slope of >30 Degrees;
- Open landscapes like lakes and estuaries; and
- Other natural land cover types.

C.8.2 Future Trends

The National Landscape Strategy 2015-2025 is in the process of being implemented and will be Ireland's vehicle for complying with the EU Landscape Convention. Landscape assessment guidance is also available from the local authorities which will be considered when identifying landscape character areas and protected areas at the project level in the future.

In the medium to long term climate change, land use, agricultural and forestry policy are likely to influence landscape. Afforestation has been one of the key trends related to landscape/land cover in Ireland over recent decades. The Forest Statistics Ireland report⁶⁶ indicates that there was an increase of 4.2% in the national area covered by forestry from the years 1985 to 2006, and a further 0.9% increase from 2006 to 2017.

The existing landscape character is not expected to change significantly in the immediate future, although, some local changes due to planned developments are potential sources of change and loss of landscape feature. Longer term influences on landscape character would be related to land use changes such as

⁶⁶ DAFM. 2020. *Forest Statistics Ireland 2020*. Accessed: 10.07.2023. Available from: <https://www.teagasc.ie/media/website/crops/forestry/advice/Forest-Statistics-Ireland-2020.pdf>

agricultural and forestry practices, and climate change responses and their impacts on habitats and landscape features.

C.8.3 Key Considerations for WSSP 2050 and the SEA

Key challenges and opportunities in relation to Landscape, Townscape and Seascape are:

Challenges

Potential for new Uisce Eireann infrastructure and systems to impact landscape, townscapes and seascapes including visual amenity during construction and operation; and Potential for the new Uisce Eireann infrastructure and systems development to be constrained by the need to protect the landscape character and local visual amenity in sensitive areas.

Opportunities

- Opportunities for enhancements linked to biodiversity and water quality improvement measures, such as restoring riparian corridors, nature-based solutions and catchment management approaches.

Table C.16 illustrates the links between this SEA topic and the WSSP 2050 issues presented in the Draft WSSP 2050.

Table C.16 SEA Topic links with the Draft WSSP 2050

WSSP Draft WSSP 2050 – issues	1. Climate change	2. Awareness and behaviours	3. Circular economy	4. Digitisation, data and cyber	5. Environment and biodiversity crises	6. Legislation, policy and regulation	7. Existing assets and new approaches to service delivery
Landscape/ Townscape/ Seascape relevance: H - high/M - medium/L - Low	H	M	M	M	H	M	H

C.9 Cultural Heritage – Archaeological and Architectural

C.9.1 Cultural Heritage

UNESCO World Heritage Sites

World Heritage Sites are places, monuments or buildings selected by the UNESCO as having outstanding universal value and meet at least 1 out of 10 selection criteria. The World Heritage Convention, which was established in 1972 by UNESCO, initiated a list of World Heritage Sites.

Record of Monuments and Places

The Record of Monuments and Places (RMP) is the statutory list of recorded monuments. Monuments listed in the RMP are afforded legal protection under the National Monuments Act 1930-2004 and any work taking place at or in relation to a Recorded Monument will typically need to be notified to the Minister.

The National Monuments Act 1930-2004 was enacted to make provision for the protection and preservation of national monuments and archaeological objects and provides for the protection of monuments and archaeological sites, the protection of the portable archaeological heritage and the regulation of archaeological works. The Historic Archaeological and Heritage Bill 2023 will replace the National Monuments Act and will represent a significant modernisation of the law protecting Ireland archaeological and historic heritage.

National Inventory of Architectural Heritage

The Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999 was enacted to provide for the establishment of a National Inventory of Architectural Heritage (NIAH) and to provide for the obligations of statutory authorities in respect of these historic monuments. In this Act “architectural heritage” means all structures and buildings together with their settings and attendant grounds, fixtures and fittings; groups of such structures and buildings; and sites which are of architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest.

Each structure is given a rating: National, Regional, Local or Record Only. Any structure rated as being Regional or higher importance will be recommended to have a separate record under the Record of Protected Structures (RPS).

Record of Protected Structures

The Planning and Development Act 2000 (as amended)⁶⁷ requires each planning authority to compile and maintain a RPS that forms part of each planning authority development plan. The purpose of the RPS is to protect structures, or parts of structures “which form part of the architectural heritage, and which are of special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest.” Sites, structures and groups of structures rated by the NIAH as being of Regional or above importance are included in the RPS which provides statutory protection for Ireland’s architectural heritage.

While the prime objective of the RPS is to protect the structure and its setting, proposals for the sensitive restoration, extension and alteration of Protected Structures are positively encouraged by the Planning Authority.

Sites and Monuments Record

The Sites and Monuments Record (SMR) appears on the Archaeological Survey of Ireland Map Viewer, however it does not, of itself confer legal protection. Not all of these are included in the RMP and hence have no statutory protection.

The designations considered as part of the cultural heritage baseline are:

- Archaeological sites monuments included on the RMPs and/or SMRs; and
- Architectural structures and sites included on the NIAH and/or RPSs.

Irish Landmark Trust sites

The Irish Landmark Trust have been saving and restoring some of Ireland’s historic buildings since 1992 and making them accessible to the wider community. As an educational non-profit organisation, the organisation’s primary aim is to conserve and sustain iconic buildings.

⁶⁷ Planning and Development Act (Revised), 2000 (c.30). Dublin: Office of the Attorney General.

Underwater Archaeological Heritage

The National Monuments Service (NMS) is also tasked with addressing the protection and preservation of Ireland’s underwater cultural heritage. The Underwater Archaeology Unit of the National Monuments Service has a wide remit, including quantification of the record, research, underwater survey, excavation and regulation. The Underwater Archaeology Unit maintains the Wreck Viewer and Wreck Inventory of Ireland Database, and also assesses potential development impacts on underwater archaeology by making recommendations to the relevant planning authorities and other regulatory bodies on developments which have the potential to impact on underwater archaeology (NMS, 2023)⁶⁸.

Unknown Archaeological Remains

The NMS has an interactive mapping search facility that provides access to all records relevant to the archaeological heritage of Ireland. This extensive body of records is stored on the national database of the Archaeological Survey of Ireland, and a list of recorded archaeological monuments for each county is available at www.archaeology.ie based on OSI mapping.

C.9.2 Cultural Heritage Baseline Condition

There are two UNESCO World Heritage Site and three UNESCO Sites on the new Tentative List that are located within Ireland (UNESCO, 2023). There are also 15 Irish Landmark Trust sites (Irish Landmark Trust, 2023)⁶⁹, as well as numerous designated and non-designated cultural heritage assets inventoried in the RMP, the SMR, the Wreck Inventory Database, the RPS⁷⁰, and the NIAH. In total there are 146,875 SMR sites (DHLGH, 2023a)⁷¹, 17,977 sites recorded on the Wrecks Inventory Database (NMS, 2023) and 48,327 sites recorded on the NIAH (NIAH, 2023)⁷². See also section 3.9.5 for Tourism and Recreation baseline as cultural heritage is also important for visitors and the local economy.

Table C.17 shows the number of cultural heritage sites in each county for the SMR and the NIAH. Given the number of small sites across Ireland, these are best viewed on the Department of Culture, Heritage and the Gaeltacht’s ‘Historic Environment Viewer’ website. There are also several undesignated heritage assets within the marine area surrounding the country and potentially unknown, undesignated archaeological and architectural remains, throughout Ireland.

Figure C.21 below shows World Heritage Sites, key tourist sites, and monuments in Ireland.

Table C.17 Cultural Heritage sites in Ireland

County	Sites and Monuments Record	National Inventory of Architectural Heritage
Carlow	1,849	291
Cavan	2,447	770
Clare	9,070	450
Cork	18,206	8,467
Donegal	3,552	2,289

⁶⁸ NMS. 2023. *Underwater Archaeology*. Accessed: 04.12.23. Available from: <https://www.archaeology.ie/underwater-archaeology>

⁶⁹ Irish Landmark Trust. 2023. *Ireland*. Accessed: 27.11.2023. Available from: <https://irishlandmark.com/>

⁷⁰ The number of Protected Structures per county is not listed above. However, Protected Structures can be found listed on each local authority’s Record of Protected Structures. There are over 40,000 Protected Structures in Ireland. These will need to be considered for individual project assessments.

⁷¹ DHLGH. 2023a. *Historic Environment Viewer*. Accessed: 04.12.2023. Available from: <https://maps.archaeology.ie/HistoricEnvironment/>

⁷² NIAH. 2023. National Inventory of Architectural Heritage (NIAH) National Dataset. Accessed: 04.12.2023. Available from: <https://www.isde.ie/geonetwork/srv/eng/catalog.search#/metadata/a5df0102-928d-441f-a61d-92f67d4fdf6e>

County	Sites and Monuments Record	National Inventory of Architectural Heritage
Dublin	3,355	7,535
Galway	12,833	1,963
Kerry	14,115	860
Kildare	2,936	1,581
Kilkenny	4,746	1,917
Laois	1,739	692
Leitrim	2,445	391
Limerick	8,149	2,192
Longford	2,577	842
Louth	2,363	1,347
Mayo	8,589	1,470
Meath	4,880	1,132
Monaghan	1,633	1,257
Offaly	4,724	1,196
Roscommon	6,804	402
Sligo	6,743	803
Tipperary	8,923	2,031
Waterford	3,060	2,698
Westmeath	4,514	1,617
Wexford	3,780	2,842
Wicklow	2,843	1,293

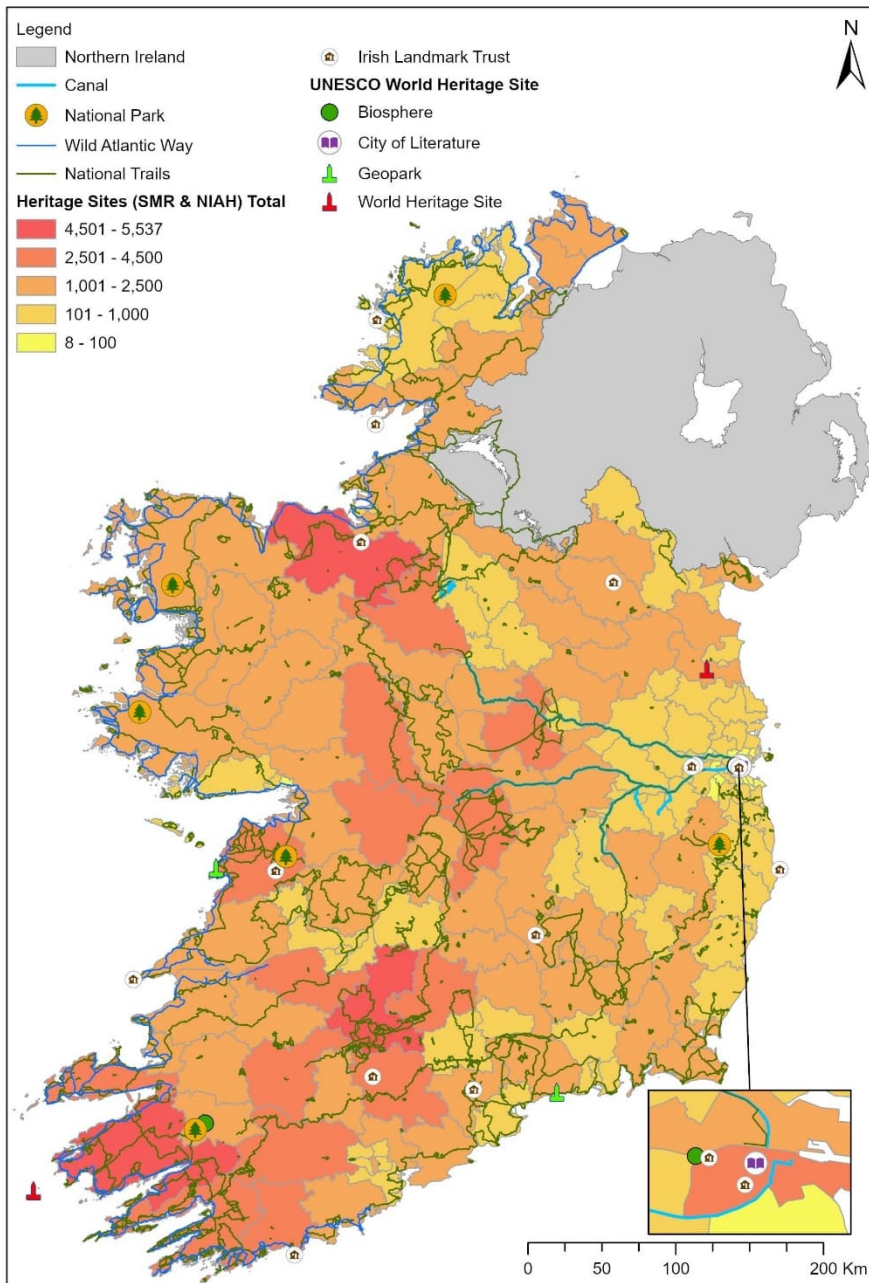


Figure C.21 Cultural heritage, tourist sites and World Heritage Sites in Ireland (EPA, n.d.⁷³; Sport Ireland, 2023⁷⁴; GSI, 2023)

C.9.3 Future Trends

The National Heritage Plan, Heritage Ireland 2030, was published in 2022⁷⁵. This plan sets out a wide range of actions aimed at protecting and nurturing Ireland’s heritage and recognising the importance of community engagement and the links to biodiversity and climate change. An Implementation Plan for the actions is to be developed. The Historic Archaeological and Heritage Bill 2023, replacing the National Monuments Act, will introduce a single integrated licensing system and statutory codes of practice, and will confer legal protection on new finds at archaeological sites. These forthcoming changes to cultural heritage legislation and policy

⁷³ EPA. 2023. *EPAMaps*. Accessed: 07.08.2023. Available from: <https://gis.epa.ie/EPAMaps/>

⁷⁴ Sport Ireland. 2023. *Sport Ireland Outdoors National Trails Register*. Accessed: 15.08.2023. Available from: https://data.gov.ie/dataset/sport-ireland-outdoors-national-trails-register?package_type=dataset

⁷⁵ DHLGH. 2023b. *Heritage Ireland 2030*. Accessed 04.07.2023. Available from <https://www.gov.ie/en/publication/778b8-heritage-ireland-2030/>

strengthen the protection of designated cultural, archaeological and architectural heritage assets and as well as undesignated archaeological. There are recognised threats to heritage assets from development activities affecting settings or resulting in loss of buried unknown assets. Climate change and habitat loss can also affect the preservation of buried archaeological remains.

C.9.4 Key Considerations for WSSP 2050 and the SEA

The key challenges and opportunities in relation to Cultural Heritage for the WSSP 2050 and SEA are:

Challenges

- The potential for the construction of water services infrastructure to damage archaeological and architectural heritage monuments/sites (both terrestrial and underwater and known and unknown sites) or affect access to or the settings of sites/monuments;
- The potential for new structures to impact the setting of heritage sites/monuments; and
- New developments could be constrained by the need to avoid and protect sites/monuments and their settings.

Opportunities

- Opportunities for linking protecting heritage with supporting biodiversity and climate change objectives; and
- Potential to uncover unknown, undesignated archaeological remains, including underwater and marine archaeology, allowing them to be recorded, knowledge to be gathered and access to be improved to cultural heritage and archaeology.

Table C.18 illustrates the links between this SEA topic and the WSSP 2050 issues presented in the Draft WSSP 2050.

Table C.18 SEA topic links with the Draft WSSP 2050

WSSP Draft WSSP 2050 – issues	1. Climate change	2. Awareness and behaviours	3. Circular economy	4. Digitisation, data and cyber	5. Environment and biodiversity crises	6. Legislation, policy and regulation	7. Existing assets and new approaches to service delivery
Cultural Heritage relevance: H - high/M - medium/L - Low	H	M	M	M	H	M	H

C.10 Geology and Soils

C.10.1 Geology Baseline Condition

According to the Soil Geochemical Atlas of Ireland (2007)⁷⁶, the counties of Cavan and Monaghan are mainly underlain by Lower Palaeozoic shales, grits and greywackes. The Southeast of Ireland including counties such

⁷⁶ Teagasc. 2007. Soil Geochemical Atlas of Ireland. Accessed 04.07.2023. Available from https://www.teagasc.ie/media/website/publications/2011/Soil_Geochemical_AtlasofIreland.pdf

as Carlow, Kilkenny and Waterford consist predominantly of Lower Palaeozoic sedimentary and igneous rocks (rhyolites, andesites and greywackes). Towards the centre of Ireland, the predominant bedrock geology are carboniferous limestones, which vary from very pure to impure shaley varieties in the central counties of Offaly, Westmeath and Laois. Towards the southern counties of Kerry and Cork the underlying geology is composed of Old Red Sandstone. North of these, in northern Kerry, western Limerick and western Clare there are a series of Upper Carboniferous sediments, mainly shales and grits, sitting on top of comparatively pure limestones. The bedrock geology in the western counties of Ireland such as Galway and Mayo comprise of granite in the south and Lower Palaeozoic and late Pre-Cambrian metamorphic rocks north of this. In the North, most of county Donegal is underlain by a complex series of rocks comprising schists (metamorphosed from mudstones and muddy sandstones), and quartzites.

The Superficial deposits comprise the unconsolidated geological deposits which cover the solid geology. Thickness of these deposits are variable. Generally, towards the southern counties the bedrock is overlain with boulder clay deposited during the last glaciation in the Pleistocene period. Towards the western coastline of Ireland raised bogs and blanket bogs are present as a result of the gradual increase in temperature.

The Geological Survey of Ireland (GSI) have identified Irish Geological Heritage (IGH) Sites as part of their IGH Programme, a partnership between GSI and the NPWS. IGH sites comprise caves, dry valleys, springs and swallow holes. The number of IGH sites within or intersecting each county, along with the mineral location sites and active quarries are shown in Table C.19.

Table C.19 Irish Geological Heritage sites, mineral location sites and active quarries⁷⁷

County	Number of IGH sites	Numbers of Mineral Location Sites	Number of active quarries
Carlow	6	109	2
Cavan	27	153	5
Clare	45	335	16
Cork	Data not available	722	25
Donegal	101	787	6
Dublin	22	Data not available	5
Galway	134	1,089	20
Kerry	Data not available	268	22
Kildare	22	Data not available	7
Kilkenny	26	165	5
Laois	33	157	Data not available
Leitrim	32	131	3
Limerick	30	185	12
Longford	15	72	4
Louth	33	96	2

⁷⁷ GSI. 2023. *Geological Heritage*. Accessed: 20.07.23. Available from: <https://www.gsi.ie/en-ie/data-and-maps/Pages/Geoheritage.aspx#County>

County	Number of IGH sites	Numbers of Mineral Location Sites	Number of active quarries
Mayo	101	570	8
Meath	28	Data not available	20
Monaghan	20	153	2
Offaly	28	118	13
Roscommon	29	207	6
Sligo	25	121	3
Tipperary	69	381	15
Waterford	47	188	2
Westmeath	28	109	6
Wexford	42	368	13
Wicklow	64	Data not available	7

Note: Counties Kerry and Cork have not been audited for geological heritage sites and information from the Geological Survey Ireland is currently not available. County Laois has not been audited for the number of active quarries and information from the Geological Survey Ireland is currently not available.

C.10.2 Soil Baseline Condition

There is relatively little legislation relating directly to soil and soil protection at an international level and there is no legislation solely directed to soil protection in Ireland. However, the key driver for future policy is the EU Soil Strategy for 2030⁷⁸ which was published in 2021. This sets out the aim for EU soils to be in a healthy condition by 2050. Soils are defined in this strategy as:

“when they are in good chemical, biological and physical condition, and thus able to continuously provide as many of the following ecosystem services as possible:

- *provide food and biomass production, including in agriculture and forestry;*
- *absorb, store and filter water and transform nutrients and substances, thus protecting groundwater [and surface water] bodies;*
- *provide the basis for life and biodiversity, including habitats, species and genes;*
- *act as a carbon reservoir;*
- *provide a physical platform and cultural services for humans and their activities;*
- *act as a source of raw materials;*
- *constitute an archive of geological, geomorphological and archaeological heritage”.*

Figure C.22 below shows the distribution of soil types in Ireland.

⁷⁸ Communication From The Commission To The European Parliament, The Council, The European Economic And Social Committee And The Committee Of The Regions. *EU Soil Strategy For 2030 Reaping The Benefits Of Healthy Soils For People, Food, Nature And Climate*, Com (2021) 699, Final. Accessed 26.07.23]. Available From <http://Eur-Lex.Europa.Eu/>

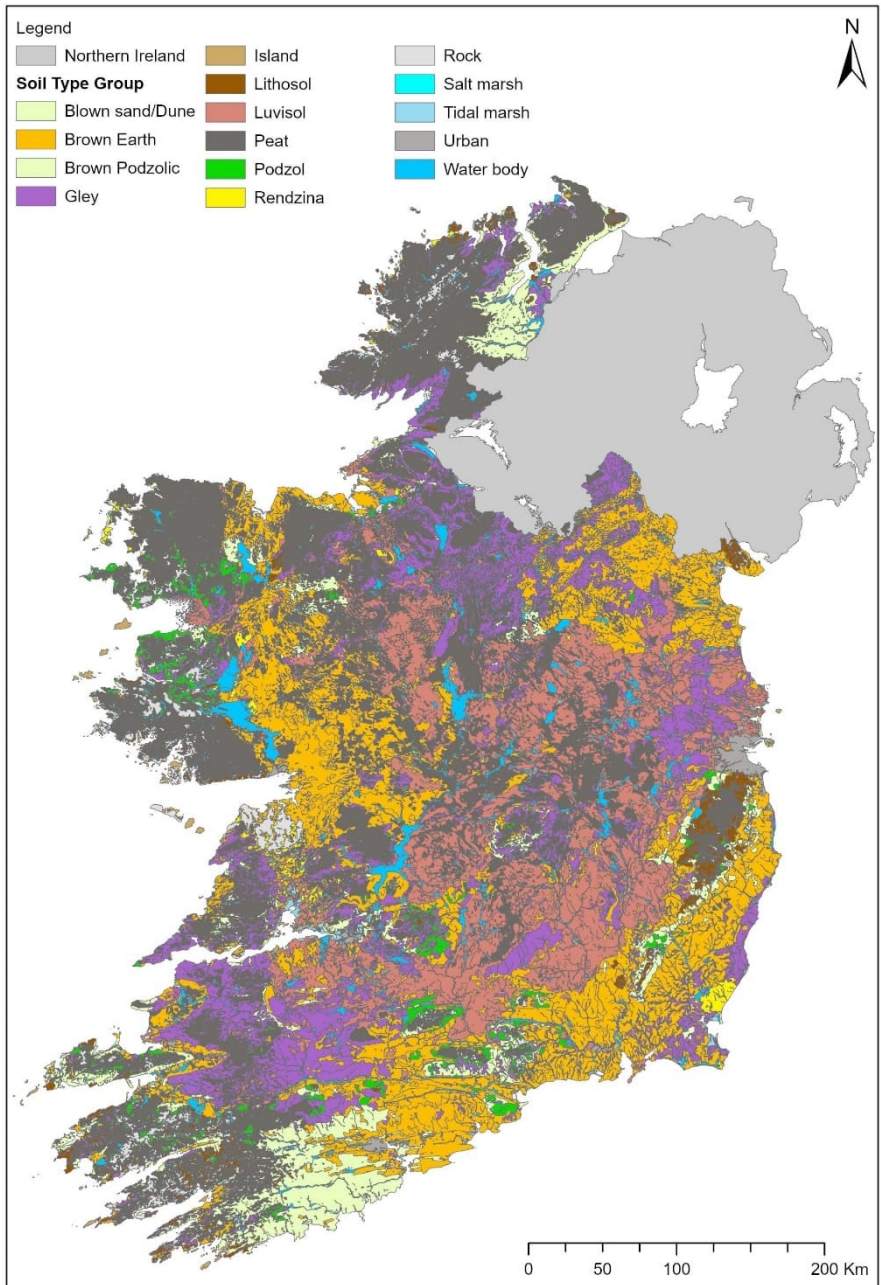


Figure C.22 Simplified Soil types in Ireland (EPA, 2018b)⁷⁹

Soil Quality or Contamination

The EPA (2020a) highlights six key degradation processes that can impact on soils: soil sealing, erosion, organic matter decline, compaction, salinisation and landslides. Surface sealing (urbanisation) is the main soil quality pressures for Ireland with human activity also being a significant driver of degradation through poor (or inappropriate) land management practices.

Soil contamination can occur as a result of unauthorised waste-related activities, historical activities, leakages and accidental spillages of chemicals. The EPA is responsible for enforcing the remediation of contamination identified at EPA-licensed facilities but there is currently no specific contaminated land policy or legislation in Ireland.

⁷⁹ EPA. 2018b. *Irish Soil Information System*. Accessed: 15.08.2023. Available from: <http://gis.teagasc.ie/soils/downloads.php>

Peatlands

Peatland soils are organic soils and according to the National Peatlands Strategy⁸⁰, only 10% of the original raised bog and 28% of the original blanket peatlands resource are suitable for conservation (as natural peatlands). Land drainage, reclamation for agricultural purposes and peat extraction have all impacted peatlands.

The damage caused by these activities also has a negative effect on climate mitigation, as it prevents carbon sequestration and reduces the available carbon stock as, when drained, peat oxidises, and CO₂ is released.

The NEROS project 2013- 2015, funded by the EPA, explored the climate and biodiversity benefits of rewetting peatlands which involves restoring natural water flow and saturating previously drained peatland. NEROS showed that rewetting peatland can reduce greenhouse-gas emissions and quickly bring back peat-forming vegetation and associated rare biodiversity. More recent projects such the AUGER Project 2014 – 2020 also identified how different types of peatland are suitable for different approaches for effective rewetting management schemes. The EU Soil Strategy and proposed EU Nature Recovery Law include objectives supporting peatland restoration.

Mineral Soils

The EU Soil Strategy states that mineral soils have a carbon content below 20%, and often below 5%. However, the carbon content is the basis for soil's biodiversity, health and fertility. Carbon sequestration in mineral soils can also make a significant contribution to carbon retention given the extent of these soils and both farmland and forestry can benefit from measures which simultaneously improve forest productivity, carbon sink function and healthy soil properties.

Soil and the Circular Economy

Soil plays a key role in recycling water, carbon and nutrients, and can break down and filter pollutants as well as providing raw material resource. The EU Soil Strategy 2030 proposes a land take hierarchy placing emphasis on aiming to avoid loss of soil resources and promote development of healthy soils.

C.10.3 Future Trends

Changes in geology are generally considered to happen over very long timescales. However, changes affecting soils due to water regime, climate change, land use practices influence soil carbon, nutrients levels and erosion rates and are relevant within the timescale for the WSSP 2050.

Soils and ecosystems services they support are resources that need to be protected, monitored and managed, from high-level national and sectoral land use plans through to local management activities on farms, forest plantations, peatlands, urban and rural settlements. In the absence of European and national soil legislation, the challenge remains to ensure a consistent approach to protecting and managing the limited soil resource, in the context of supporting environmentally sustainable economic and population growth. The EU Soil Strategy to 2030 which is closely linked to the EU Biodiversity Strategy and a proposed EU Nature Restoration Law, sets out actions to support achieving its overarching long term aims which should also influence future national policy related to soils.

Since the National Peatlands Strategy was first published, climate change has been recognised as a key social, economic and environmental issue has brought new impetus to the need to preserve remaining functional peatlands and to accelerate the restoration of damaged peatlands to support biodiversity, provide valuable ecosystem services and act as carbon sinks.

⁸⁰ NPWS. 2015. *National Peatlands Strategy*. Accessed 20.08.23. Available from <https://www.npws.ie/sites/default/files/publications/pdf/NationalPeatlandsStrategy2015EnglishVers.pdf>

C.10.4 Key Considerations for WSSP 2050 and the SEA

Key challenges and opportunities in relation to geology and soils potentially relevant for the WSSP 2050 and the SEA are:

Challenges

- Land take with a loss of soil resources from construction works on water/wastewater services infrastructure.
- Soil management and health affecting how water and nutrients are retained in soil and susceptibility to erosion with loss of soil and high levels sediment and nutrients in run off entering water bodies.
- Potential impact on geological resources and protected sites from construction works; and
- Effects on soil quality, beneficial and negative, from sludge spreading and potential for waterbody pollution.

Opportunities

- Opportunities for peatland restoration including peat rewetting initiatives, catchment-based soil conservation initiatives and wetland enhancements/creation. These approaches can support water quality and soil health and provide other ecosystem benefits such as carbon sequestration and support biodiversity enhancement; and
- Opportunities to use soil management plans to apply hierarchy to avoid loss and promote reuse and maintain soil health.

Table C.20 illustrates the links between this SEA topic and the WSSP 2050 issues presented in the Issues.

Table C.20 SEA Topic links with the Draft WSSP 2050

WSSP Draft WSSP 2050 – issues	1. Climate change	2. Awareness and behaviours	3. Circular economy	4. Digitisation, data and cyber	5. Environment and biodiversity crises	6. Legislation, policy and regulation	7. Existing assets and new approaches to service delivery
Geology & Soils relevance: H - high/M - medium/L - Low	H	M	H	M	H	M	H

C.11 Air Quality

C.11.1 Air Quality Baseline Condition

Air pollution is a major environmental risk to our health. According to the WHO, air pollution can increase the risk of stroke, heart disease, lung cancer, and both chronic and acute respiratory diseases, including asthma. It is estimated that there are approximately 1,300 premature deaths annually in Ireland⁸¹ due to poor air quality from fine particulate matter (PM^{2.5}).

⁸¹ EPA. 2021b. *Air Quality in Ireland Report 2021*. Accessed: 31.10.2022. Available from: <https://indd.adobe.com/view/67188a5f-37ff-44bd-b335-5d168fdcf113>

Under the EU’s Green Deal’s Zero Pollution Action Plan⁸², the European Commission set the 2030 goal of reducing the number of premature deaths caused by fine particulate matter (PM^{2.5}, a key air pollutant), by at least 55% compared with 2005 levels. To this end, in 2022 the European Commission published a proposal to review the ambient air quality directives, aiming, among other things, to align the air quality standards more closely with WHO recommendations.

Air quality in Ireland is generally good, however, there are concerning localised issues. For example, air quality monitoring results in 2021 showed that fine particulate matter (PM^{2.5}) mainly from burning solid fuel in homes, and nitrogen dioxide (NO₂) mainly from road transport, are the main threats to good air quality. EPA monitoring shows that PM^{2.5} and NO₂ levels in 2021 were within EU legal limits but did exceed the WHO Air Quality guidelines (AQGs) for health.

The CAFÉ (Ambient Air Quality and Cleaner Air for Europe) Directive establishes objectives on how to assess ambient air quality in order to reduce, prevent and avoid harmful effects on our health and on the environment. Table C.21 shows Ireland’s level of compliance with the legal limits for selected pollutants in 2021.

The air quality monitoring network comprised of 97 operational stations at the end of 2021 and the EPA is currently developing the National Emissions Monitoring Network, a requirement under the NECD (National Emission reduction Commitments Directive) (EPA, 2021b). The Network’s goal is to monitor certain air pollutants (such as ammonia) and their impacts on sensitive ecosystems.

Table C.21 Selected pollutants measured in 2021 failing the WHO AQG levels (EPA, 2021b)

Pollutant	Number of stations, parameter monitored in 2021	WHO Air Quality Guideline (AQG)
PM ₁₀	87	Above annual WHO AQG value at 8 stations. Above daily WHO AQG value at 21 stations
PM _{2.5}	81	Above annual WHO AQG value at 65 stations. Above daily WHO AQG value at 61 stations
NO ₂	30	Above WHO annual or 24-hour AQG level at 23 stations
Ozone (O ₃)	21	Above WHO AQG level at 19 stations
Sulphur dioxide (SO ₂)	15	Above WHO 24-hour AQG level at 1 station
PAHs	5	Above EEA reference level at 3 stations

Under the Clean Air for Europe Directive, EU member states must designate “Zones” for the purpose of managing air quality. For Ireland, four zones were defined in the Air Quality Standards Regulations (2011).

According to the EPA (2021b), the main areas defined in each zone are:

- Zone A: Dublin;
- Zone B: Cork;

⁸² European Commission. 2021. *Zero pollution action plan*. Accessed: 20.07.23. Available from: https://environment.ec.europa.eu/strategy/zero-pollution-action-plan_en

- Zone C: Other cities and large towns comprising Limerick, Galway, Waterford, Drogheda, Dundalk, Bray, Navan, Ennis, Tralee, Kilkenny, Carlow, Naas, Sligo, Newbridge, Mullingar, Wexford, Letterkenny, Athlone, Celbridge, Clonmel, Balbriggan, Greystones, Leixlip and Portlaoise; and
- Zone D: Rural Ireland, i.e., the remainder of the State excluding Zones A, B and C.

In general, the water industry is not a major contributor to air quality issues, although there is potential for contribution to local air pollution through Uisce Éireann's vehicles, generator plants and drinking water residuals treatment facilities. At the local level there is the potential for odour nuisance as a result of nearby wastewater treatment facilities. This will need to be considered further at the project level. There is a requirement to comply with air pollution regulations and also identify potential opportunities for reducing emissions.

C.11.2 Future Trends

Europe as part of the European Union's (EU) Green Deal and the EU's zero pollution visions for 2050 is revising its air quality standards to align them more closely with the lower WHO recommendations.

WHO published new AQGs in 2021 based on the impact of pollutants on our health. There are 4 Interim Targets (IT) identified (IT1, IT2, IT3, IT4) towards achieving the final AQG levels. Achieving the WHO Air Quality Guidelines in the future will be a major challenge for Ireland and all of Europe.

Current air quality in Ireland is of an acceptable standard and remains within the European Union (EU) legislative and target values. However, ozone, particulate matter and PAHs are emerging as pollutants of concern in the short term, when compared with WHO guidelines and European Economic Area reference level values. Levels of Nitrogen Oxide (NO) are also expected to increase.

Although air quality in Ireland is good, there is potential for emerging pollutants to rise above limits/targets in the future. Vehicle emissions are one of the main sources of air pollution in Ireland, along with electricity generation, industry and agriculture (EPA, 2020a).

LIFE Emerald is a four-year EU – Irish government funded forecasting and modelling project which started in 2021. It will allow the public to make more informed health related decisions on a daily basis with the help of a 3-day air quality forecast, and near-real time and historical air quality maps for the entire country.

The GLOBE Programme is an international science and education programme that provides school students with the opportunity to participate in citizen science. The GLOBE Ireland Air Quality Campaign is a citizen science campaign to assess traffic-related air pollution at schools, involving over 600 teachers/students throughout Ireland.

Clean Air Together (CAT) is a citizen science project where people voluntarily measure levels of Nitrogen Dioxide (NO₂) in their local area. This is done to create a better understanding of NO₂ air pollution. The first measurement campaign took place in 2021 with 1,000 citizens across Dublin participating. Clean Air Together has moved to Cork in 2022.

C.11.3 Key Considerations for WSSP 2050 and the SEA

Challenges and Opportunities

Key challenges and opportunities in relation to air quality potentially relevant for the WSSP 2050 and the SEA are:

- The temporary generation of air pollution such as during construction and operational phases of water resources and wastewater infrastructure development, although it should be noted that

upgrades to existing infrastructure and the provision of new services are likely to present an opportunity to utilise technologies that are more energy efficient.

- Odour can be a concern from wastewater treatment and agricultural sludge spreading and new facility design or upgrades to wastewater treatment will need to take account of standards required in relation to receptors around plants and good practice approaches for sludge spreading and storage.

In the context of the development of the WSSP 2050, the challenges and opportunities related to air quality are considered localised issues addressed through application of appropriate standards identified at programme and project levels. In terms of the SEA of the WSSP 2050 they will therefore be considered generally as in terms of potential nuisance or disturbance effects under the topic of population and health.

Table C.22 illustrates the links between this SEA topic and the WSSP 2050 issues presented in the Issues.

Table C.22 SEA topic links with the Draft WSSP 2050

WSSP Draft WSSP 2050 – issues	1. Climate change	2. Awareness and behaviours	3. Circular economy	4. Digitisation, data and cyber	5. Environment and biodiversity crises	6. Legislation, policy and regulation	7. Existing assets and new approaches to service delivery
Air Quality relevance: H - high/M - medium/L - Low	L	L	L	L	M	L	M

C.12 Noise and Vibration

C.12.1 Noise and Vibration Baseline Condition

According to the WHO, noise is defined as unwanted sound and can be harmful to human and ecosystem health. The Noise Directive (2002/49/EC), which is commonly referred to as the Environmental Noise Directive or END relating to the assessment and management of environmental noise, was transposed into Irish national legislation via the Environmental Noise Regulations 2006 (S.I. No. 140 of 2006). This Directive called for the development of strategic noise maps and action plans for major roads, railways, airports and cities.

The END defines a common approach intended to avoid, prevent or reduce on a prioritised basis the harmful effects, including annoyance, due to exposure to environmental noise. The END does not set any limit value, nor does it prescribe the measures to be used in the action plans, which remain at the discretion of the competent authorities. Limit values are left to each member state. At this point in time, Ireland does not have any statutory noise limit values.

The relevant planning authorities are required to prepare noise action plans designed as a means of managing land use planning, traffic management and control of noise sources. This has yet to be completed, but the EPA has now published guidance for local authorities on the content of the plans. Sixty per cent of annual progress reports on Noise Action Plans due from the local authorities for 2020, were received in 2021 by the EPA. Implementation of Noise Action Plans (noise mitigation) is a complex issue involving many organisations including local authorities, Transport Infrastructure Ireland and DECC.

Water and wastewater infrastructure development is not expected to add significantly to noise pollution. Uisce Éireann acknowledges that construction noise can have adverse effects on terrestrial and marine environments and therefore it will be considered through scheme construction management and design for local receptors and during operation for sensitive receptors in close proximity.

C.12.2 Future Trends

Future noise trends are difficult to predict. The Environmental Noise Regulations 2006 may be revised in future to enforce a stricter level of noise management, and further strategic noise maps and plans are to be developed.

The EPA has commissioned a three-year research project Noise and Health Evidence from Ireland that will provide a detailed review of the relationship between environmental noise and health/wellbeing. This research will provide a national estimate of the burden of disease from environmental noise in disability-adjusted-life-years (DALYs). It is led by University College Dublin and the Economic and Social Research Institute (ESRI). The aim is to combine noise modelling and health data to examine contributory relationships between noise exposure and health/wellbeing outcomes.

C.12.3 Key Considerations for WSSP 2050 and the SEA

The key challenges and opportunities in relation to noise and vibration potentially relevant to the WSSP 2050 and SEA are:

Challenges and Opportunities

- Generation of noise during construction and operation of water resources infrastructure;
- Generation of noise from the construction and operation of water treatment and wastewater treatment and including the disposal of sludge waste, related to the use of plant and HGV movements; and
- Opportunities to consider noise and vibration standards in design and procurement where sensitive receptors may be affected.

In the context of the development of the WSSP 2050, the challenges and opportunities related to noise and vibration are considered localised issues to be addressed through the application of appropriate standards at programme and project levels. In terms of the SEA of the WSSP 2050 they will therefore be considered generally as potential nuisance or disturbance effects under the topic of population and health.

Table C.23 illustrates the links between this SEA topic and the WSSP 2050 issues presented in the Issues.

Table C.23 SEA Topic links with the Draft WSSP 2050

WSSP Draft WSSP 2050 – issues	1. Climate change	2. Awareness and behaviours	3. Circular economy	4. Digitisation, data and cyber	5. Environment and biodiversity crises	6. Legislation, policy and regulation	7. Existing assets and new approaches to service delivery
Noise & Vibration relevance: H - high /M - medium/L - Low	L	L	L	L	M	L	M

C.13 Transboundary Environment

The Governments of Ireland, Northern Ireland and the United Kingdom cooperate on transboundary environmental management issues. Ireland’s draft RBMP 2022-2027 reports that the respective jurisdictions have adopted similar approaches to addressing and tackling environmental issues such as water quality, atmospheric pollution, invasive species, the effects of climate change, coastal resilience, migratory species, marine litter, marine protected areas (MPAs) and protecting habitats and species native to the island and its waters.

C.13.1 Water Environment

Key organisations for coordination and cooperation on WFD implementation include:

- North South Water Framework Directive Coordination Group;
- National Technical Implementation Group (NTIG);
- Northern Ireland Environment Agency (NIEA);
- Loughs Agency;
- Border Region Operational Committee;
- North West Water Forum; and
- Source to Tap (Interreg project) members.

Cross-border projects ongoing which focus on delivering water quality improvements in water bodies on the border include:

- The INTERREG VA Programme (2014-2020); and
- EU PEACE PLUS programme – catchments and their water resources are recognized as key environmental and economic asset to deliver significant benefits through the ecosystem services that they provide – including drinking water, wastewater assimilation, angling, tourism and cultural heritage.

The draft RBMP 2022-2027 for the ROI identifies that Ireland shares two river basin districts (RBD) with Northern Ireland. Within these, there are eight ROI cross-border WFD catchments shared between Northern Ireland and Republic of Ireland and numerous shared WFD waterbodies, including rivers, lakes, coastal and transitional waterbodies and groundwater waterbodies, numbering around 120 in total:

- Neagh Bann International RBD – 35 shared water bodies; and
- North Western International RBD – 85 shared water bodies.

The shared RBD and WFD catchments, and marine waters beyond the WFD transitional and coastal waterbodies are shown on Figure C.23 below.

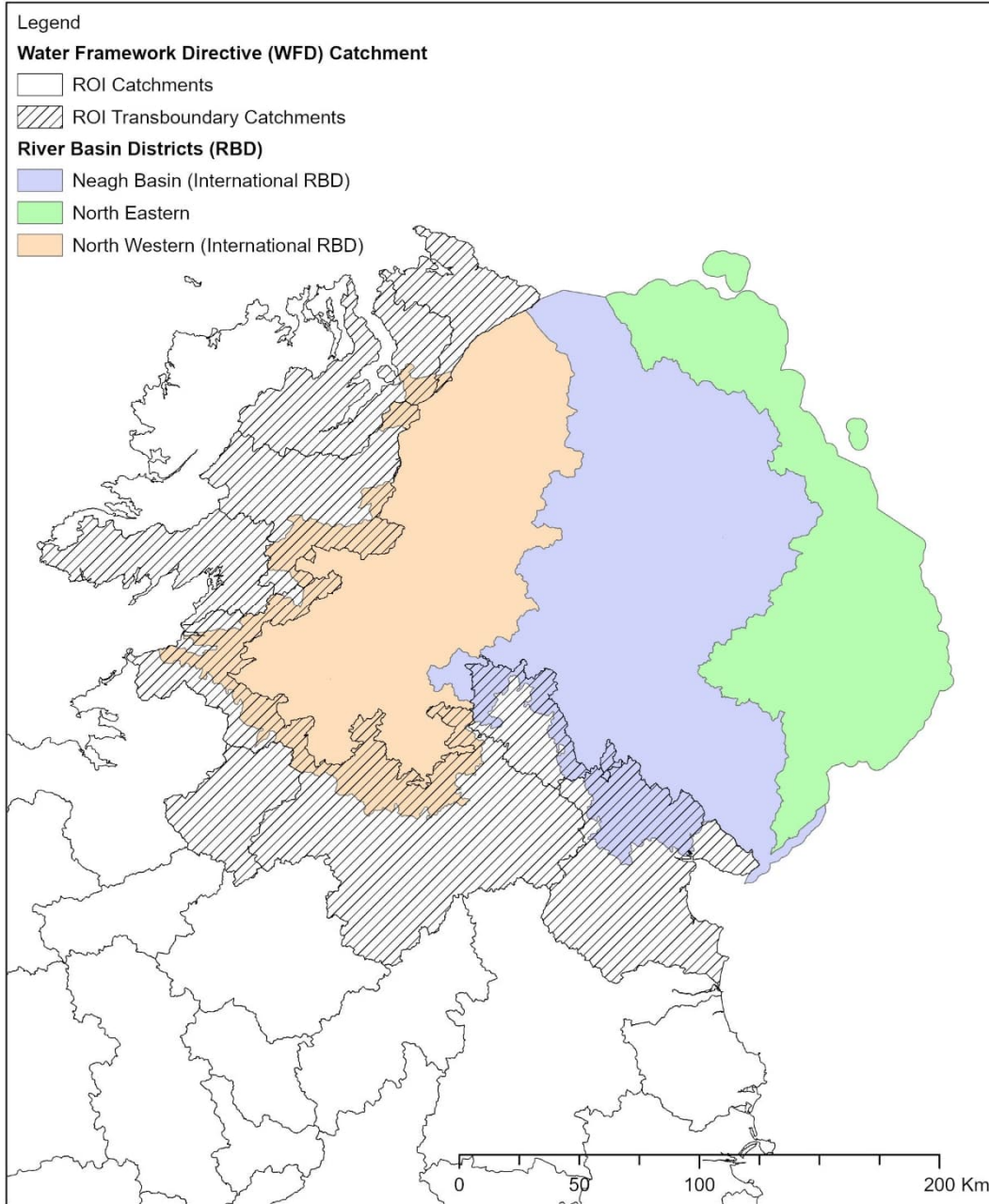


Figure C.23 Shared NI River Basins Districts and ROI WFD catchments (DAERA, 2023⁸³; EPA, 2022a)

The Northern Ireland WFD Statistics report (DAERA, 2023) compared water body status for 2015, 2018 and 2021 and these results are summarised below.

River waterbody ecological and overall status for 450 waterbodies:

- 2015 – 147 (33 %) river waterbodies were classified as good or high ecological and overall status.

⁸³ DAERA. 2023. *WFD Statistics Report*. Accessed: 12.08.23. Available from: <https://www.daera-ni.gov.uk/publications/northern-ireland-environmental-statistics-report-2023>

- 2018 – 141 (31 %) river water bodies were classified as good or high ecological and overall status.
- 2021 – 140 (31%) river waterbodies were classified as good or high ecological status. No river water bodies achieved good or high overall status due to inclusion in monitoring of ubiquitous, persistent, bioaccumulative, toxic (uPBT) chemicals.

Lakes ecological and overall waterbody status for 20 waterbodies:

- 2015 and 2018, 5 (24%) of the 21 lake water bodies in Northern Ireland were classified as good or high for ecological status and overall status and 16 (76%) lake water bodies were classified as 'moderate or worse'.
- 2021, 3 (14%) lakes were classified as good ecological status with 18 lakes (86%) classified as 'moderate or worse' but for overall status, no lakes achieved good overall status due to inclusion of uPBT.

Transitional and coastal ecological status for 25 waterbodies:

- 2015, 1 (4%) water body achieved high ecological status and 8 (32%) achieved good ecological and overall status.
- 2018, 10 (40%) achieved good ecological and overall status.
- 2021, 10 (40%) achieved good ecological status but no water bodies achieved good overall status due to inclusion of uPBT.

Northern Ireland river and lake waterbody status is presented in Figure C.24.

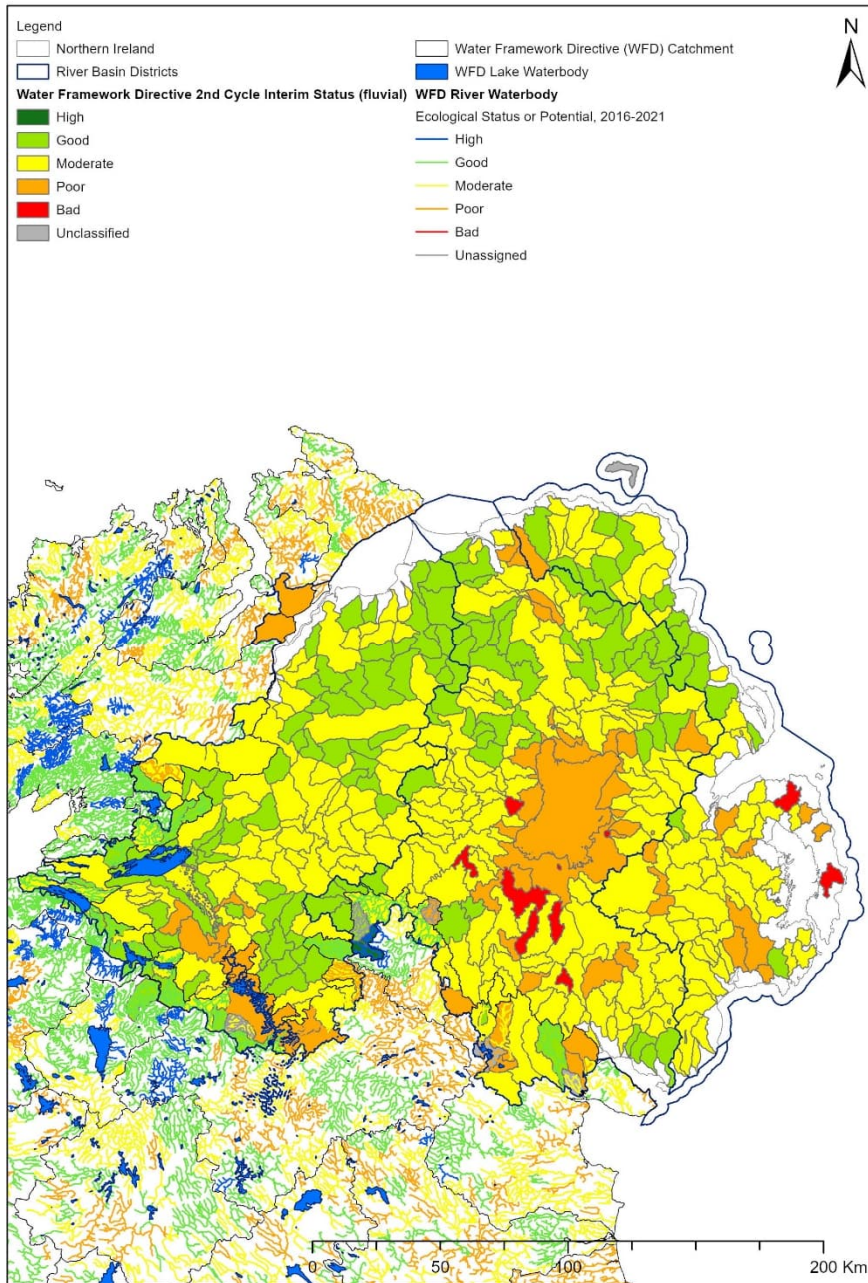


Figure C.24 River and lake water body status in Northern Ireland (DAERA, 2022⁸⁴)

According to NIEA (2021)⁸⁵, there are 26 bathing waters around Northern Ireland’s coast. In 2022, 25 of these were reported to have met quality standards, with 21 of these classified as ‘Excellent’, three classified as ‘Good’ and one as ‘Sufficient’. One site at Ballyholme failed to meet the minimum standard.

There are 10 Shellfish Waters Protected Areas in Northern Ireland according to DAERA, and these are subject to Shellfish Action Plans that are to be reviewed as part of the third RBMP cycle. Good water quality is recognized to be important for the production of high-quality shellfish safe for consumption. Water quality and shellfish can be impacted by pollution from various sources, such as run-off from agricultural land or discharges from sewage treatment works.

⁸⁴ DAERA. 2022. *Open Data NI*. Accessed: 16.08.2023. Available from: <https://admin.opendatani.gov.uk/>

⁸⁵ NIEA. 2021 (Corrected 2023). *Water Framework Directive Statistics Report*. Accessed: 04.08.2023. Available from: [http://www.daera-ni.gov.uk/sites/default/files/publications/daera/NI Water Framework Directive Statistics Report 2021.pdf](http://www.daera-ni.gov.uk/sites/default/files/publications/daera/NI%20Water%20Framework%20Directive%20Statistics%20Report%202021.pdf)

Bathing Waters, Shellfish Waters, transitional and coastal waterbodies in Northern Ireland are presented in Figure C.25.

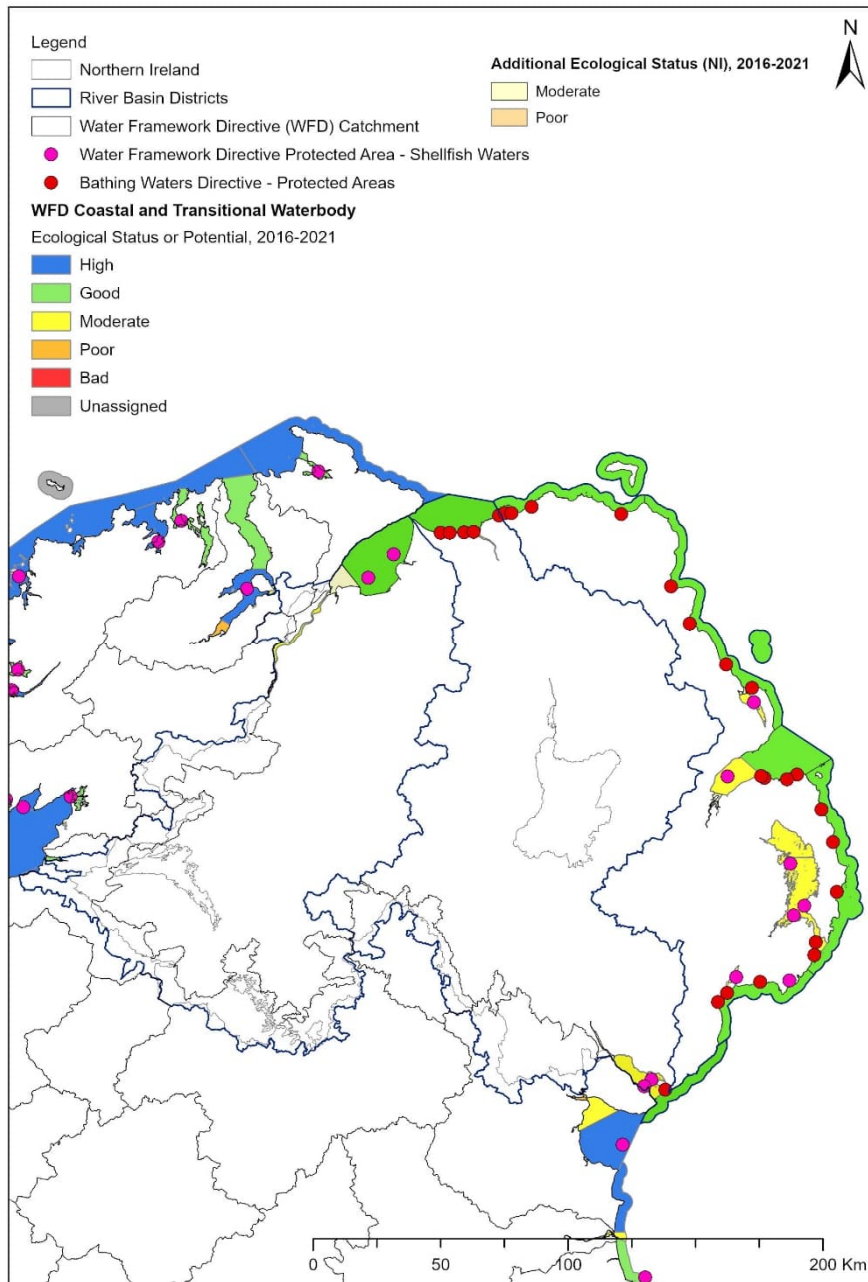


Figure C.25 Transitional and coastal waters waterbody status in Northern Ireland (DAERA, 2022)

Northern Ireland’s marine and coastal waters fall under the UK Marine Strategy which aims to achieve clean, healthy, safe, productive and biologically diverse seas. To help assess progress to achieving Good Environmental Status (GES) the strategy uses 11 qualitative descriptors. These have been colour coded to demonstrate where GES has been achieved (green), partially achieve (orange) or not achieved (red):

- Biological diversity (cetaceans, seals, birds, fish, pelagic habitats and benthic habitats);
- Nonindigenous species;
- Commercially exploited fish and shellfish;
- Food webs (cetaceans, seals, birds, fish and pelagic habitats);
- Eutrophication;

- Sea-floor integrity (pelagic habitats and benthic habitats);
- Hydrographical conditions;
- Contaminants;
- Contaminants in fish and other seafood for human consumption;
- Litter; and
- Introduction of energy, including underwater noise.

In summary, GES has been achieved for eutrophication, changes in hydrographical conditions, contaminants, and contaminants in seafood. GES has been partially achieved for cetaceans, seals, pelagic habitats, food webs and the input of anthropogenic sound. GES has not been achieved for litter, commercial fish, non-indigenous species, benthic habitats, fish and birds (UKMMAS, 2018)⁸⁶.

C.13.2 Biodiversity and Landscape

In Northern Ireland there are 58 Special Areas of Conservation (SACs), 18 Special Protected Areas (SPAs), including the East Coast Marine SPA and Carlingford Marine SPA, and 20 Ramsar sites (DAERA, 2022). Marine Conservation Zones (MCZs) are adopted in Northern Ireland and five in-shore MCZs. These along with coastal Areas of Special Scientific Interest, Marine SPAs and Ramsar sites are included in their Marine Protected Areas, totalling 55 sites. In the ROI, MCZ adoption is currently at a consultation stage, however marine classifications are included in the current ROI designated sites classifications.

Other designated sites in Northern Ireland include; National Nature Reserves and Areas of Special Scientific Interest (ASSIs) as shown in Figure C.27, and Areas of Outstanding Natural Beauty (AONBs) and Seascapes as shown in Figure C.26. The designated sites are shown, including the ROI biodiversity designations in Figure C.27 and the landscape and seascape designations in Figure C.26, within the neighbouring areas with the WFD catchments and RBDs.

⁸⁶ UKMMAS. 2018. *Summary of progress towards Good Environmental Status*. Accessed: 29.11.2023. Available from: <https://moat.cefas.co.uk/>

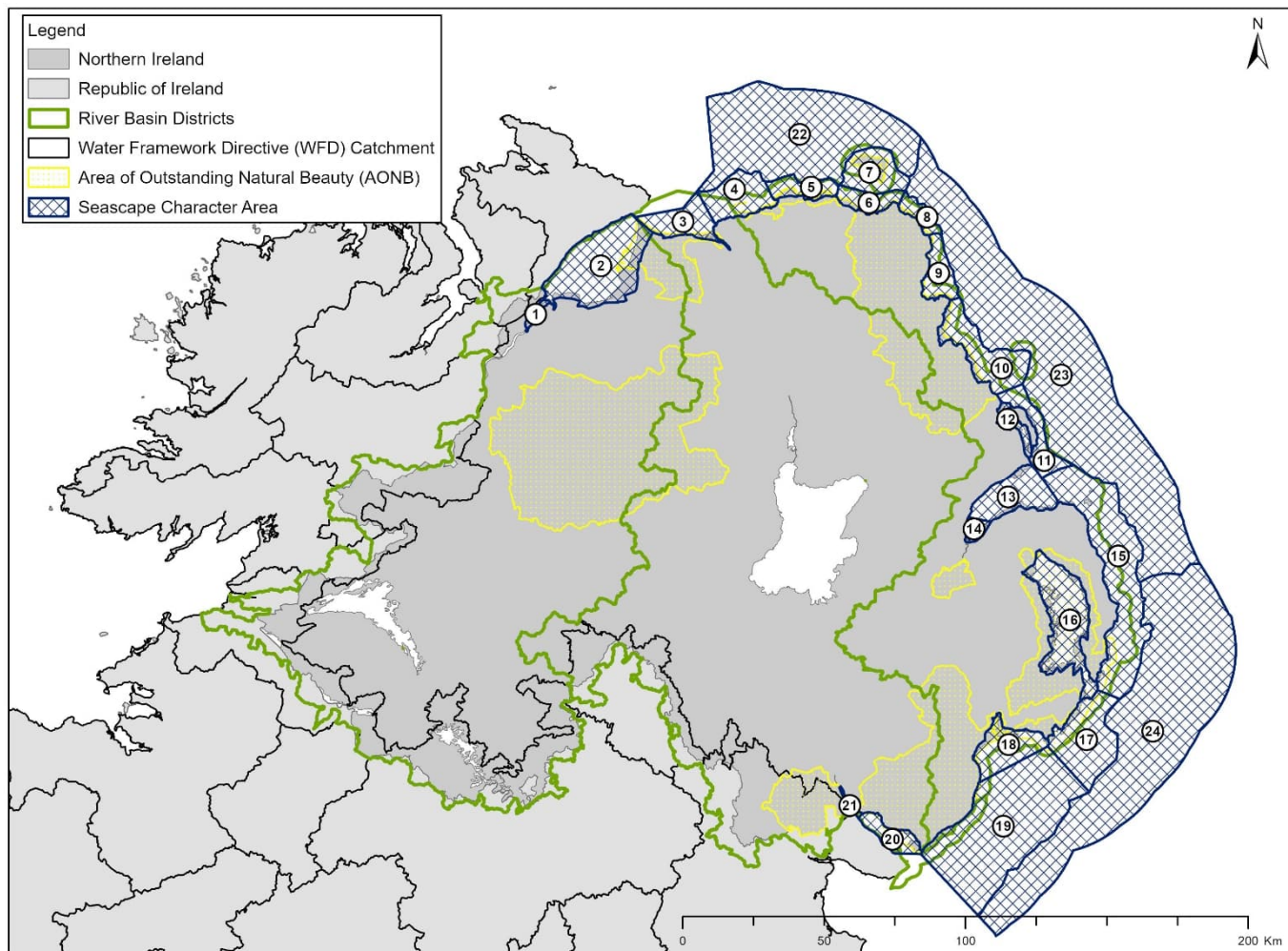


Figure C.26 Northern Ireland Landscape Designations (DAERA, 2022)

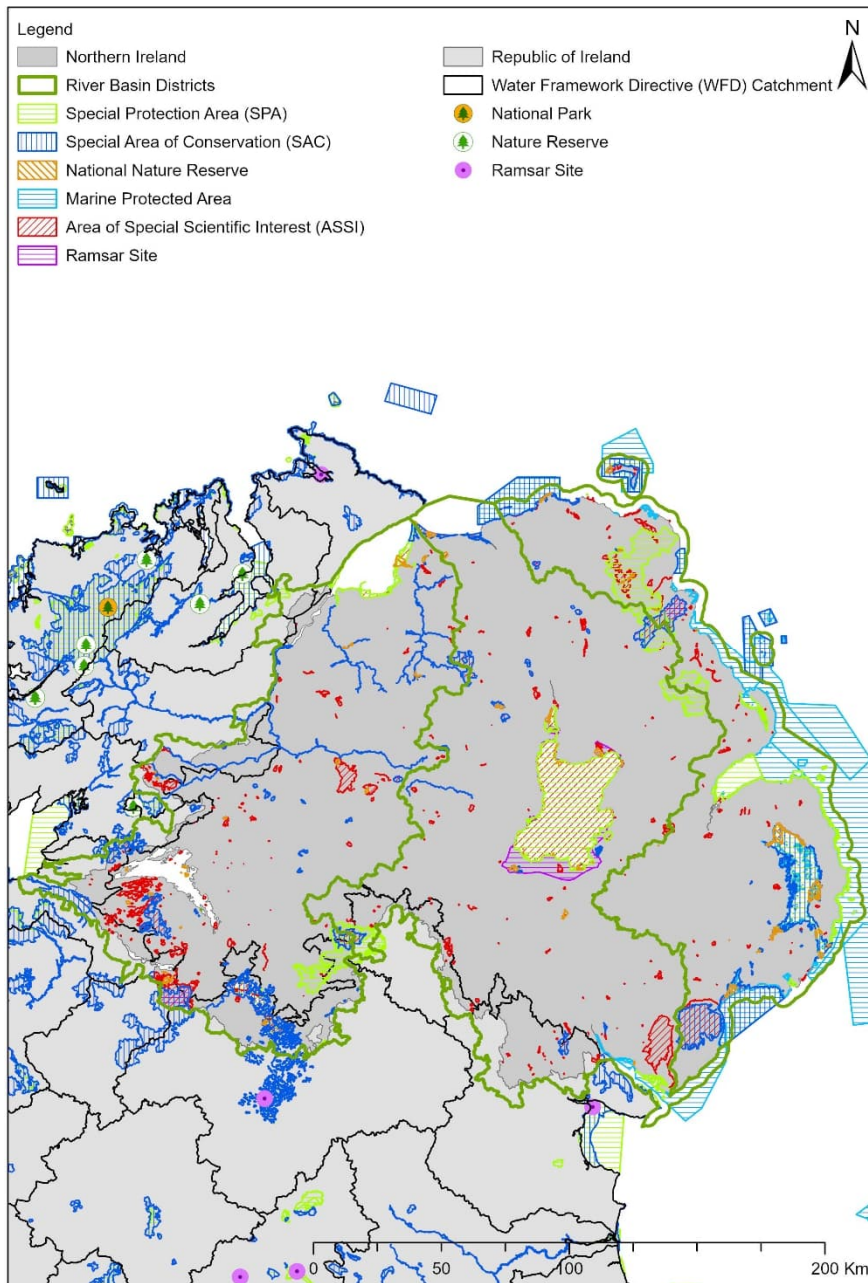


Figure C.27 Northern Ireland Biodiversity Designated Sites (JNCC, 2017⁸⁷; DAERA, 2022)

C.13.3 Cultural Heritage and Tourism

Figure C.28 shows the cultural heritage sites (both designated and undesignated) within Northern Ireland. Many of these sites are also important tourist sites. In addition, non-designated sites, archaeological interest, industrial heritage features including those associated with water courses and shipwreck sites are also part of the baseline environment.

⁸⁷ Joint Nature Conservation Committee. 2017. *Special Protection Areas (SPAs) and Special Areas of Conservation of Northern Ireland*. Accessed 16.08.2023. Available from: <https://hub.jncc.gov.uk/>

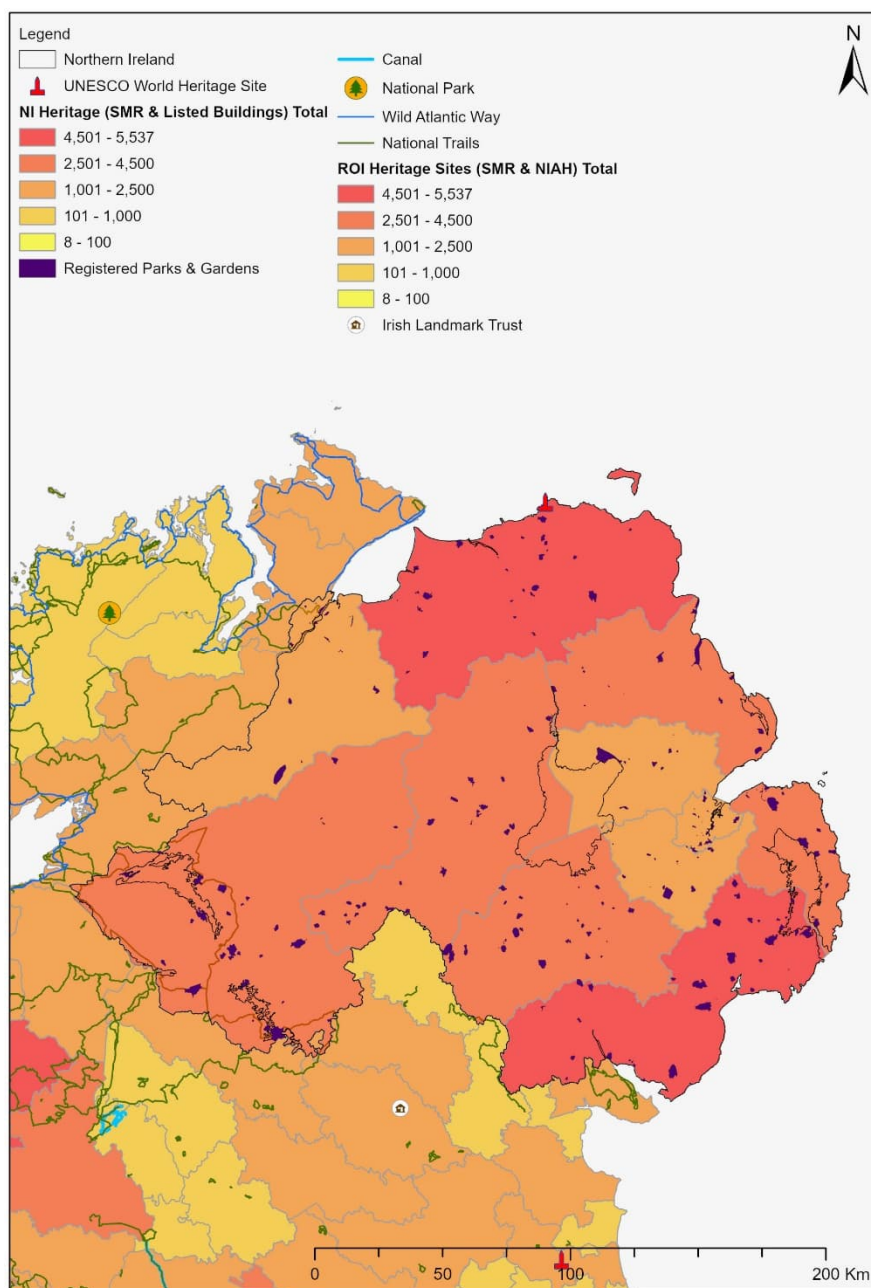


Figure C.28 Cultural heritage and tourism in Northern Ireland^{88,89}

C.13.4 Summary of Sources of Information

A summary of the key sources of information on the Northern Ireland baseline environment by topic area is provided in Table C.24. These sources will be considered further where potential for transboundary effects or pathways for effects are identified for the draft WSSP 2050.

General sources of sources information on the baseline environment for Northern Ireland are:

- State of the Environment Report for Northern Ireland (2013) – From Evidence to Opportunity; and
- Northern Ireland Environmental Statistics Report (May 2023) provides an annual update adding to the information and trends outlined in the State of the Environment Report for Northern Ireland.

⁸⁸ Department for Communities. 2018. *Northern Ireland Sites and Monuments Record*. Accessed: 16.08.2023. Available from: <https://admin.opendatani.gov.uk/dataset/northern-ireland-sites-and-monuments-record>

⁸⁹ NIEA. 2016. *World Heritage Site*. Accessed: 16.08.2023. Available from: <https://admin.opendatani.gov.uk/dataset/world-heritage-site>

Table C.24 Northern Ireland Baseline Information and Data Sources

Topic	Data
Water Environment	<p>WFD information: https://www.daera-ni.gov.uk/publications/northern-ireland-environmental-statistics-report-2023</p> <p>Ground water, surface water and marine environment information for 2022: Northern Ireland Environmental Statistics Report (daera-ni.gov.uk)</p> <p>DAERA Marine Map Viewer: https://gis.daera-ni.gov.uk/arcgis/apps/webappviewer/index.html?id=e44a8e27333241bfa2faf4a387fd99d7</p> <p>Bathing Waters: Northern Ireland's Bathing Waters show overall improvement in 2022 Department of Agriculture, Environment and Rural Affairs (daera-ni.gov.uk)</p> <p>Flooding: https://dfi-ni.maps.arcgis.com/apps/webappviewer/index.html?id=fd6c0a01b07840269a50a2f596b3daf6</p>
Population, Socio-economics and Health	<p>CENSUS 2021 Statistics: https://www.nisra.gov.uk/statistics/census</p>
Climate Change	<p>Climate Change Mitigation Branch refers Uisce Éireann to the recently passed Climate Change Act (Northern Ireland) 2022: https://www.legislation.gov.uk/nia/2022/31/contents/enacted</p> <p>The UK Climate Change Committee recently published its Climate Risk Independent Assessment 2021 which identifies the risk and opportunities posed by climate change over the next five years. A summary for Northern Ireland can be found below: https://www.ukclimaterisk.org/independent-assessment-ccra3/national-summaries/</p>
Biodiversity	<p>Designated Scientific Sites: www.daera-ni.gov.uk/landing-pages/protected-areas</p> <p>DAERA have a map browser for NI protected sites and known priority habitat: www.daera-ni.gov.uk/services/natural-environment-map-viewer</p> <p>Northern Ireland Priority Species List: https://www.daera-ni.gov.uk/sites/default/files/publications/doe/northern-ireland-priority-species-list.pdf</p>
Fisheries and Angling	<p>DAERA – Fisheries Policy: https://www.daera-ni.gov.uk/articles/fisheries-policy</p> <p>https://www.daera-ni.gov.uk/sites/default/files/publications/daera/FSDP%20final%20report%20April%202021%20-%20Final%20version%20for%20publication%2027%20April%202021.PDF</p> <p>Shellfish waters (WFD protected areas for the protection of economically significant aquatic species): Shellfish Water Protected Areas Department of Agriculture, Environment and Rural Affairs (daera-ni.gov.uk)</p> <p>Angling: https://www.nidirect.gov.uk/articles/angling-regulations-rules#toc-2</p>
Landscape, Townscape and Seascape	<p>Northern Ireland Landscape Character Assessment: https://www.daera-ni.gov.uk/publications/northern-ireland-landscape-character-assessment-six-distinctive-landscapes</p> <p>Northern Ireland Regional Seascape Assessment: https://www.daera-ni.gov.uk/publications/northern-ireland-regional-seascape-character-assessment</p>
Cultural Heritage – Archaeological	<p>UNESCO: https://whc.unesco.org/en/statesparties/gb</p> <p>Historic buildings and monuments: https://www.nidirect.gov.uk/articles/historic-buildings-and-monuments</p>

Topic	Data
and Architectural	Department for Communities, Historic Environment Map Viewer: https://dfcgis.maps.arcgis.com/apps/webappviewer/index.html?id=6887ca0873b446e39d2f82c80c8a9337 Historic Environment Division Digital Datasets: https://www.communities-ni.gov.uk/publications/historic-environment-digital-datasets Landmark sites: https://www.theirelandwalkingguide.com/trails.html
Geology and Soils	Northern Ireland State of the Environment Reports: https://www.daera-ni.gov.uk/publications/state-environment-report-2013 Northern Ireland Environmental Statistics Report 2023: https://www.daera-ni.gov.uk/publications/northern-ireland-environmental-statistics-report-2023
Air Quality	Information on NO ₂ and particulate matter trends: Northern Ireland environmental statistics report Department of Agriculture, Environment and Rural Affairs (daera-ni.gov.uk) Air pollution information is provided: https://www.daera-ni.gov.uk/publications/air-pollution-northern-ireland-2021
Noise and Vibration	Noise level maps are available through a web mapper: Noise Department of Agriculture, Environment and Rural Affairs (daera-ni.gov.uk)
Material assets	Land use: https://land.copernicus.eu/pan-european/corine-land-cover/clc2018
All topics	Northern Ireland State of the Environment Reports: https://www.daera-ni.gov.uk/publications/state-environment-report-2013 Northern Ireland Environmental Statistics Reports: https://www.daera-ni.gov.uk/publications/northern-ireland-environmental-statistics-report-2023 Our natural environment datasets are available at the link below: www.daera-ni.gov.uk/articles/download-digital-datasets

C.13.5 Key Considerations for WSSP 2050 and the SEA

Key challenges and opportunities with potential cross border effects:

Challenges

- Pressures on the water environment related to runoff with sediment and nutrient loading causing pollution;
- Abstraction pressure on shared surface and groundwater bodies;
- Wastewater discharges affecting rivers and coastal waters and associated designated sites; and
- Potential impacts due to proximity of infrastructure development on cultural heritage, landscape and habitats.

Opportunities

- Opportunities to reduce pollution of water bodies and improve raw water quality for water supply through nature-based solutions and sustainable catchment management solutions.

Table C.25 illustrates the links between this SEA topic and the WSSP 2050 issues presented in the Issues.

Table C.25 SEA topic links with the Draft WSSP 2050

WSSP Draft WSSP 2050 – issues	1. Climate change	2. Awareness and behaviours	3. Circular economy	4. Digitisation, data and cyber	5. Environment and biodiversity crises	6. Legislation, policy and regulation	7. Existing assets and new approaches to service delivery
Transboundary relevance: H - high/M - medium/L - Low	M	M	M	M	H	H	H