



NATIONAL BIORESOURCES STRATEGY (DRAFT)

Pre-consultation NIS

Contents

1	INTRODUCTION	1
1.1	Legislative Context	1
1.2	Purposes of the Appropriate Assessment Process	2
1.3	Stages of Appropriate Assessment	2
2	SCREENING FOR APPROPRIATE ASSESSMENT	3
3	ASSESSMENT METHODOLOGY	4
3.1	Guidance	4
3.2	Guiding Principles on Case Law	4
3.3	Information Sources	5
3.4	Impact Prediction	5
4	THE ASSESSED PLAN – THE DRAFT NATIONAL BIORESOURCES STRATEGY	7
4.1	Background and Context	7
4.2	Wastewater Sludge and Bioresource - Overview	8
4.3	Relevant EU Directives	8
4.3.1	The Sewage Sludge Directive (SSD) (86/278/EEC, 1986)	8
4.3.2	The Water Framework Directive (2000/60/EC, 2000)	9
4.3.3	The Drinking Water Directive (2020/2184, 2020)	10
4.3.4	The Nitrates Directive (91/676/EEC, 1991)	10
4.3.5	The Waste Framework Directive (08/98/EEC, 2008)	11
4.3.6	The recast Urban Wastewater Treatment Directive (2024/3019, 2024)	11
4.3.7	Soil Monitoring Law (2025/2360, 2025)	12
4.4	Technical Strategies	13
4.4.1	Treatment Infrastructure and Processes	14
4.4.2	Transport of Wastewater Sludge and Bioresources	14
4.4.3	Reuse/Recycling of Bioresources	14
4.5	Main Objectives of the Plan	15
5	SCIENTIFIC EVIDENCE BASE OF ASSESSMENT	17
5.1	Overview	17
5.2	Existing Measures in Place	18
5.2.1	Treatment Infrastructure and Processes	18
5.2.2	Transport	21
5.2.3	Reuse/Recycling	21
5.3	Baseline Environmental Context	23
5.3.1	Sludge Use Relative to Other Fertiliser Use in Ireland	23
5.3.2	Geographic Context	24
5.3.3	Water Quality	24
5.3.4	Soil Health	25
5.3.5	Air Quality	25
5.3.6	Conservation Status of EU Protected Habitats and Species	25
5.3.7	Threats and Pressures Affecting EU Protected Habitats and Species	26
5.3.8	Water Dependent Habitats and Species	42
5.4	Potential Ecological Impacts and Effects of the Bioresources Management Process	45
5.4.1	Treatment & Transport	45
5.4.2	Reuse/Recycling of Biosolids	45
6	APPROPRIATE ASSESSMENT	52
6.1	Introduction	52
6.2	Approach to Assessment of the Draft Strategy	52
6.3	European Sites Assessed by the NIS	52

Pre-Consultation NIS

6.3.1	Maintain versus Restore Favourable Conservation Status	55
6.4	Prediction of Effects	55
6.4.1	Context for Impact Prediction	55
6.4.2	Impact and Effect Identification.....	55
6.4.3	Impact and Effect Prediction.....	56
6.4.4	Assessment of Effects	56
6.5	Assessment of In-Combination Effects	75
7	MITIGATION MEASURES	86
7.1	Introduction.....	86
7.2	Plan Specific Mitigation	86
7.2.1	Overview of Mitigation Requirements	86
7.2.2	Standard Operating Procedure (SOP) for Landspreading of Biosolids	87
7.2.3	Research.....	93
7.2.4	Monitoring	93
7.2.5	Review of the Strategy and NIS Mitigation Measures	93
8	PRELIMINARY CONCLUSIONS OF APPROPRIATE ASSESSMENT	94
9	REFERENCES	95
	APPENDICES	99

Tables

Table 4-1: Roles and responsibilities associated with each technical strategy of the UÉ bioresource management process.....	13
Table 4-2: Key Objectives, Aims and Actions for Achieving the Draft Strategy	15
Table 5-1: List of Potential Contaminants Found in Biosolids, and Their Regulation for Use in Agriculture*.....	20
Table 5-2: Buffer Strips to be Observed During the Landspreading of Biosolids. Extracted from Fehily Timoney & Company (2008a).	22
Table 5-3: Relevant Pressure/Threat Data for Annex I Habitats and Annex II Species based on NPWS Article 17 Reporting (NPWS, 2025b; NPWS, 2025c) for 2019-2024 Period.	28
Table 5-4: Relevant Pressure/Threat Data for Bird Species Listed in Article 12 Reporting for 2013-2018 Period. Pressure/threat Data for Bird Species taken from EEA Repository on Article 12 Reporting.....	36
Table 5-5: Water Dependent Annex I Habitats.....	42
Table 5-6: Water Dependent Annex II Species	44
Table 5-7: Potential Microplastics Risk Categories for Some Protected Species Listed on the Habitats Directive (HD), Birds Directive (BD) and the Relevant Red Lists. Extracted from Mahon et al. (2017).	51
Table 6-1: European Sites in the Republic of Ireland and former European Sites in Northern Ireland.....	53
Table 6-2: Summary of Potential Effects Arising as a Result of Technical Strategies within the Draft Strategy, and Whether these Effects Trigger Actual or Potential Adverse Effects on the Integrity of European Sites.....	61
Table 6-3: Assessment of Key Actions for Achieving the Draft Strategy.	64
Table 6-4: Assessment of In-Combination Effects	76
Table 7-1: Indicative Risk-Matrix Highlighting the Interactions Between Risk Characterisation of Lands and Contaminants within Biosolids, and Potential Outcomes of these Interactions.	88
Table 7-2: Potential Data Sources for Land Suitability/Risk Assessment.	89

Figures

Figure 4-1: Relationship of the Tier 1 WSSP to Tier 2 Strategic Plans, Supporting Strategies and more detailed implementation plans and their relationship to national and local policies and strategies.....	7
Figure 6-1: European Sites.....	54
Figure 6-2: Shows the Locations of Bioresource Centres.....	57
Figure 7-1: Schematic Outlining Proposed Risk-Based Approach to Development of a SOP for the Landspreading of Biosolids Produced by UÉ.....	92

Appendices

Appendix A Summary of the conservation status of protected habitats and species from 2007 to 2025	100
Appendix B List of SACs in the Republic of Ireland.....	106
Appendix C List of SPAs in the Republic of Ireland.....	118
Appendix D List of Former SACs in Northern Ireland.....	123
Appendix E List of Former SPAs in Northern Ireland.....	126

1 INTRODUCTION

This document, which constitutes a Natura Impact Statement (NIS), has been prepared to inform the Competent Authority's Appropriate Assessment (AA) with respect to the draft National Bioresources Strategy (formerly known as the National Waste Strategy Management Plan (NWSMP)). The draft National Bioresources Strategy or "draft Strategy" for the purpose of this report, is an update of the existing NWSMP which was originally published in 2016. The draft Strategy has been prepared by Uisce Éireann (UÉ) and sets out the strategic objectives regarding management of bioresources in Ireland. There are a wide range of bioresources from the wastewater effluent stream, however, the draft Strategy is only focussed on the bioresources associated with wastewater sludge.

The reviewed draft Strategy constitutes the "plan" subject to this AA.

This NIS is structured as follows:

- **Section 1:** Introduction
- **Section 2:** Screening for Appropriate Assessment;
- **Section 3:** Assessment Methodology;
- **Section 4:** The Assessed Plan – The Draft National Bioresources Strategy;
- **Section 5:** Scientific Evidence Base of Assessment;
- **Section 6:** Appropriate Assessment;
- **Section 7:** Mitigation Measures; and
- **Section 8:** Preliminary Conclusions of Appropriate Assessment.

1.1 Legislative Context

The requirement for AA derives from Article 6(3) of the EU Habitats Directive 92/43/EC, as amended, and relates to the consideration of plans or projects with respect to European Sites forming the Natura 2000 network.

Article 6(3) requires that:

"...any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public".

Thus, Article 6(3) provides a two-stage process:

- The first stage involves a screening for appropriate assessment.
- The second stage arises where, having screened the plan or project, it is determined that there is potential for likely significant effects and an AA is required to inform decision making by the relevant Competent Authority.

In the event that the assessment completed with respect to Article 6(3) is unable to conclude no adverse effect on the integrity of a European Site, Article 6(4) makes provision for the consenting of such plans or projects subject to the absence of alternative solutions, a requirement for the plan or project to be carried out for imperative reasons of overriding public interest (IROPI) and the provision of all compensatory measures necessary to ensure that the overall coherence of the Natura 2000 network is protected.

The provisions of the Habitats Directive have been transposed into Irish legislation via the European Communities (Birds and Natural Habitats) Regulations 2011, as amended, and the parallel provisions relating to AA in planning legislation (i.e. Part XAB of the Planning and Development Act, 2000, as amended, and associated Regulations). The assessment set out in this document has been prepared with reference to the primary and domestic legislation.

This document sets out the assessment with respect to Article 6(3) as it relates to the assessment of adverse effects on the integrity of European Sites with reference to their published Conservation Objectives.

1.2 Purposes of the Appropriate Assessment Process

The overall purpose of the AA process is to ensure that the draft Strategy does not result in any adverse effects on the integrity of any European Sites in view of their Conservation Objectives. This NIS has been prepared to inform the AA process having regard to the legislative requirements of EU and national law as outlined previously. The responsibility for carrying out the AA lies with the Competent Authority. This NIS will inform the AA determination to be made by the Competent Authority in respect of the draft Strategy.

1.3 Stages of Appropriate Assessment

Appropriate Assessment is typically a three-stage process as summarised below:

- **Stage 1: Screening / Test of Significance:** This process identifies whether the proposed plan / project is directly connected with, or necessary to, the management of a European Site(s) and identifies whether the plan / project is likely to have significant effects on a European Site(s) either alone or in combination with other plans / projects. The output from this stage is a determination of not likely to have significant effects, likely to have significant effects, or possibility of significant effects. Plans and projects that are considered not likely to have significant effects beyond reasonable scientific doubt can be processed without reference to the subsequent steps of Article 6(3).
- **Stage 2: Appropriate Assessment:** This stage considers the impact of the proposed plan/project on the integrity of a European Site(s), either alone or in combination with other plans / projects, with respect to: (i) the site's conservation objectives; and (ii) the site's structure, function, and its overall integrity. The output from this stage is an NIS. This document must include sufficient information to enable the Competent Authority to carry out the AA and ascertain whether the plan or project will adversely affect the integrity of the site concerned. If the assessment is negative, i.e., adverse effects on the integrity of a site cannot be excluded despite incorporation of measures to avoid, reduce or mitigate the adverse effects, then the process must consider alternatives (Stage 3).
- **Stage 3: Procedure under Article 6(4):** This stage is undertaken when it cannot be determined that a plan/project will not adversely affect the integrity of a European Site. Such plans or projects may only be approved by the competent authorities if a derogation is sought in accordance with the provisions of Article 6(4). These provisions entail three key requirements that must be met and documented.
 1. Alternative ways of achieving the objectives of the plan / project have been considered and it can be demonstrated that the alternative put forward for approval is the least damaging for habitats and species and for the integrity of the Natura 2000 site, and that no other feasible alternative exists that would not adversely affect the integrity of the site.
 2. There are Imperative Reasons of Overriding Public Interest (IROPI), including 'those of a social or economic nature'.
 3. All compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected are taken.

2 SCREENING FOR APPROPRIATE ASSESSMENT

In order to comply with the requirements of Article 6(3) of the EU Habitats Directive, the process of Screening for AA was undertaken with respect to the draft Strategy (as summarised in **Section 4**). The AA Screening assessed the likelihood that the draft Strategy would result in significant effects on any European Sites within the Natura 2000 network (including for the avoidance of doubt, in this case, the former Natura 2000 network sites in Northern Ireland), either alone or in combination with other plans and projects. The screening report prepared concluded that an AA of the draft Strategy was required given the strategic nature of the draft Strategy, the current stage of preparation of the draft Strategy and in light of a number of uncertainties relating to the implementation of the draft Strategy going forward. Therefore, adopting the precautionary principle, it was concluded that an NIS should be prepared consistent with Article 6(3) of the EU Habitats Directive. This NIS will therefore assess whether the draft Strategy, in view of best scientific knowledge and applying the precautionary principle, will result in any adverse effects on the integrity European Sites.

3 ASSESSMENT METHODOLOGY

3.1 Guidance

The AA requirements of Article 6 of the Habitats Directive follow a sequential approach as outlined in the following legislation, guidance documents and Departmental Circulars, namely:

European and National Legislation

- Council Directive 2009/147/EC on the conservation of wild birds, codified version (also known as the 'Birds Directive').
- Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (also known as the 'Habitats Directive').
- European Communities (Birds and Natural Habitats) Regulations 2011 as amended; and
- Planning and Development Act 2000, as amended.

Guidance

- Assessment of Plans and Projects Significantly Affecting Natura 2000 sites: Methodological Guidance on the Provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC, European Commission (2021a);
- Guidance document on the strict protection of animal species of Community interest under the Habitats Directive, European Commission (2021b);
- Practice Note PN01 Appropriate Assessment Screening for Development Management, Office of the Planning Regulator (OPR), (2021);
- Guidance on the Strict Protection of Certain Animal and Plant Species under the Habitats Directive in Ireland, NPWS/Department of Housing, Local Government and Heritage (2021);
- Managing Natura 2000 sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC European Commission (2019);
- Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management (CIEEM), (2018);
- Interpretation Manual of European Union Habitats, Version EUR 28, European Commission (2013);
- Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities. Department of Environment, Heritage and Local Government (2009, revised 2010);
- Communication from the Commission on the Precautionary Principle. European Commission (2000).

Departmental/NPWS Circulars

- Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities. Circular NPW 1/10 and PSSP 2/10, DEHLG (2010).
- Appropriate Assessment of Land Use Plans. Circular Letter SEA 1/08 & NPWS 1/08, Department of Environment, Heritage and Local Government (2008).

3.2 Guiding Principles on Case Law

Over time, legal interpretation has been sought on the practical application of the legislation concerning AA as some terminology has been found to be unclear. European and national case law has clarified a number of issues and some aspects of the published guidance documents have been superseded by case law. Case law has been considered in the preparation of the NIS of the draft Strategy.

3.3 Information Sources

The following general sources of information have been consulted for background environmental information. Information was accessed over Q4 of 2025 and Q1 of 2026.

- GeoHive online mapping <http://map.geohive.ie/mapviewer.html>;
- National Parks and Wildlife Service – online European Site information www.npws.ie;
- Joint Nature Conservation Committee (JNCC) – online European Site information for former European Sites in Northern Ireland <https://jncc.gov.uk/>;
- Ireland’s Article 17 Reports 2025, National Parks and Wildlife Service;
- Ireland’s Article 12 submission to the EU Commission on the Status and Trends of Bird Species (2013-2018);
- Environmental Protection Agency (EPA) – EPA maps www.epa.ie;
- Information on River Basin Districts – <https://www.catchments.ie/>;
- Geological Survey of Ireland (GSI) – geology, soils and hydrogeology www.gsi.ie; and
- Ireland’s 4th National Biodiversity Plan 2023-2030 (DHLGH, 2024) – <https://www.gov.ie/en/publication/93973-irelands-4th-national-biodiversity-action-plan-20232030/>

3.4 Impact Prediction

The methodology for the assessment of impacts and effects is derived from EC guidance, namely the *Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites* (EC, 2021a). When describing changes/activities and impacts on ecosystem structure and function, the types of impacts that are commonly presented and which must be considered include:

- Direct and indirect impacts;
- Temporary or permanent impacts;
- Short and long-term impacts; and
- Cumulative impacts.

A “source-pathway-receptor” approach has been applied for this assessment. The **source** relates to the actions and technical strategies outlined in the draft Strategy which have the potential to adversely affect European Sites. The **pathways** relate to how implementation of the draft Strategy can potentially affect European Sites, e.g., habitat loss, habitat fragmentation, habitat deterioration, disturbance to species and impacts/effects on water quality. The **receptor** is the Natura 2000 Network, potentially including those transboundary sites for which there is a pathway of connectivity as a result of the implementation of the draft Strategy.

The EC (2021a) provides specific guidance regarding AA of high-level plans. Relevant extracts are set out below:

“... there are also certain particularities in the assessment of plans, which are described further below. These particularities pertain to possible limitations and constraints and suitable approaches that can be used to overcome the difficulties and uncertainties linked with a lack of detailed information or insufficient definition of all the elements, components and actions of the plan.

The level of detail of the plan itself will determine the scope and extent of the appropriate assessment, but in all cases the assessment must aim to identify sensitive or vulnerable areas or other potential risks or conflicts with Natura 2000 sites so that these can be taken into account at later stages in the planning process.

The assessment should be proportionate to the geographical scope, to the plan’s level of detail and to the nature and extent of the likely effects. In some cases, it may not be possible to analyse in detail all the possible impacts on individual sites at this stage; however, sufficient analysis must be carried out to identify:

- *the main impacts at the level of the Natura 2000 network, including the identification of Natura 2000 sites likely to be affected, as well as possible impacts on the connectivity of the sites, and in light of*

Pre-Consultation NIS

national or regional conservation objectives for species and habitats protected by the Birds and Habitats Directives, where they exist;

- *possible broad mitigation measures such as exclusion of areas with sensitive biodiversity, or application of certain standards and best practices (e.g. minimum density of wildlife passages, use of noise screens, respecting breeding periods);*
- *possible alternatives, including different locations for projects or different methods to achieve the expected results (e.g. use of different modes of transport or technologies for production of energy);*
- *potential cumulative impacts, considering other existing or proposed plans, programmes and strategies.*

For strategic plans where it is not possible to identify effects on individual sites, the analysis should as a minimum focus on potential impacts and major risks; site-specific effects will then need to be analysed at project level. In such cases, the appropriate assessment should focus at least on determining the Natura 2000 sites that could be adversely affected as well as any EU protected habitats and species that could be affected (also outside Natura 2000), effects on connectivity, fragmentation and other effects at the network scale. This should serve to orientate the scope and focus of the assessment of individual projects.”

4 THE ASSESSED PLAN – THE DRAFT NATIONAL BIORESOURCES STRATEGY

4.1 Background and Context

UÉ is Ireland’s national regulated water utility and is responsible for providing water and wastewater services throughout Ireland. On the 1st of January 2014, through the Water Services Act 2013, UÉ (known as Irish Water at that time) assumed statutory responsibility for the provision of these water services and related investment. UÉ’s responsibility is to ensure that all its customers (households and businesses) receive a safe and reliable water supply and have their wastewater collected, appropriately treated and returned safely to the environment.

UÉ published the first Water Services Strategic Plan (WSSP) in 2015. An update of this plan (Water Services Strategic Plan 2050) has replaced the 2015 plan and has received Ministerial approval¹. The WSSP forms the highest tier (Tier 1) of asset management plans, and it sets the overarching framework for subsequent detailed implementation plans and water services projects. The WSSP provides the context for subsequent detailed implementation plans (Tier 2) including the draft Strategy subject to assessment here. There are a range of Tier 2 supporting strategies including the draft Strategy (**Figure 4-1**).

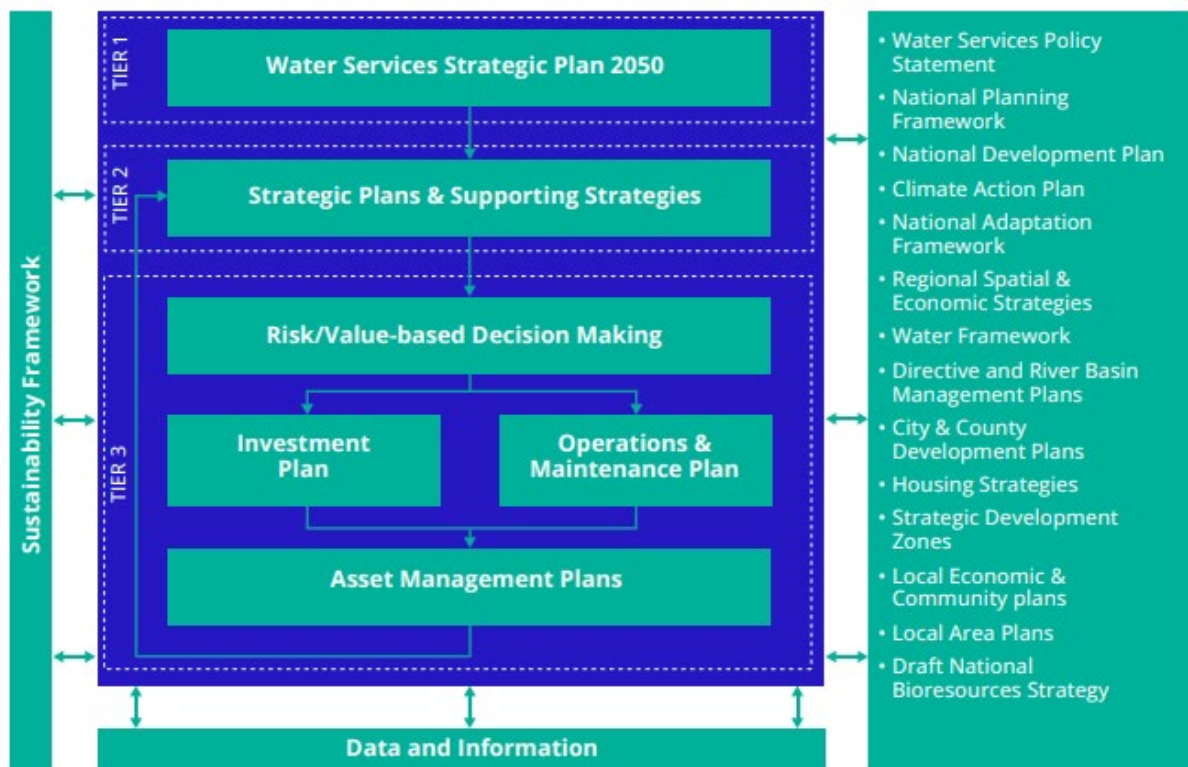


Figure 4-1: Relationship of the Tier 1 WSSP to Tier 2 Strategic Plans, Supporting Strategies and more detailed implementation plans and their relationship to national and local policies and strategies.

The draft Strategy subject to assessment in this NIS, is an update to the existing NWSMP. As part of the NWSMP review and update, and to reflect recent regulatory changes such as the recast Urban Wastewater Treatment Directive (rUWWTD) and developments across the industry in the approach to wastewater and sludge bioresource management, the NWSMP has been renamed to the “National Bioresources Strategy”. This is to ensure alignment with core principles of the circular economy, energy neutrality, net zero carbon, and sustainability.

¹ Uisce Éireann Water Services Strategic Plan 2050. Available at: <https://www.water.ie/projects/strategic-plans/water-services-strategic>

Pre-Consultation NIS

The draft Strategy sets out strategic objectives regarding bioresources and how UÉ plan to achieve them. It is a key document for UÉ that outlines their long term 25-year strategy to ensure a nationwide standardised approach for sustainably managing wastewater sludge and bioresources. The recommendations of the draft Strategy will be used to inform future capital and operational activities in relation to sustainable bioresources management in Ireland. There are a wide range of bioresources from the wastewater effluent stream, however, the draft Strategy is only focussed on the bioresources associated with wastewater sludge.

4.2 Wastewater Sludge and Bioresource - Overview

The wastewater treatment process generates a wastewater sludge. In the draft Strategy, the term “bioresources” refers to stabilised wastewater sludge (biosolids) and associated by-products such as biogas/biomethane etc. Effective and safe management of sludge, utilising its potential for energy generation and/or beneficial reuse, is identified as a key objective of the WSSP and the draft Strategy.

Wastewater sludge is the organic by-product of the biological treatment of wastewater. The term “wastewater sludge” refers to both liquid and cake sludge prior to stabilisation.

WWTPs operate biologically active processes and wastewater sludge is the natural product of this process. According to the draft Strategy, when appropriately treated and managed, sludge does not present a pathogenic risk to the environment or human health, and it can be safely recycled. It can be particularly beneficial as a soil conditioner and source of nutrient enrichment (fertiliser).

4.3 Relevant EU Directives

The following Directives are relevant to the draft Strategy and its formulation; they also inform this assessment which is being made with reference to Article 6(3) of the EU Habitats Directive.

4.3.1 The Sewage Sludge Directive (SSD) (86/278/EEC, 1986)

The Sewage Sludge Directive (SSD) (86/278/EEC, 1986), as amended, concerns the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture. This Directive has been transposed into Irish legislation by S.I. No. 148 of 1998 — Waste Management (Use of Sewage Sludge in Agriculture) Regulations, 1998, as amended.

The purpose of the SSD is defined in Article 1 *‘to regulate the use of sewage sludge in agriculture in such a way as to prevent harmful effects on soil, vegetation, animals and man, thereby encouraging the correct use of such sewage sludge’*. The aims of the SSD are to protect humans, animals, plants and the environment by ensuring that heavy metals in soil and sludge do not exceed set limits, thereby encouraging the correct use of sludge in agriculture².

Article 3 to Article 17 of the SSD outlines the roles and responsibilities of Member States in the regulation of the use of sludge in agriculture. In summary, the Articles cover:

- Treatment requirements for sludge prior to agricultural use;
- Sampling and analysis of sludge and soils;
- The cases in which the use of sludge should be prohibited;
- Sets limits for the concentration of heavy metals in sewage sludge intended for agricultural use and in sludge-treated soils;
- The requirements in relation to keeping up-to-date records;
- The requirements in relation to adapting to scientific and technical progress; and
- The preparation of consolidated reports.

² Taken from EC website, available at: https://environment.ec.europa.eu/topics/waste-and-recycling/sewage-sludge_en [Accessed 22/04/2025].

Pre-Consultation NIS

Since its adoption in 1986, the Directive has not undergone substantial revision. The SSD was recently evaluated by the European Commission (EC, 2023a). In terms of coherence³, the evaluation notes:

“The SSD is in line with the waste hierarchy set by the Waste Framework Directive, prioritising recovery of nutrients over energy recovery and disposal, notably through landfilling.

In principle, the objectives of the Directive are also aligned with other environmental and health legislation and the linked policies outlined in the Zero Pollution Action Plan and the EU Soil Strategy for 2030. However, in practice this coherence would be fully ensured if the risks linked to contaminants present in sludge were reassessed, notably reviewing the limit values and the set of pollutants which it regulates.”

In terms of relevance⁴, the evaluation notes:

“the SSD continues to be relevant and it is supported by stakeholders. However, the list of contaminants which it regulates would need review, notably considering organic compounds, pathogens, pharmaceuticals, and microplastics which are present in sewage sludge. The risks which they pose when sludge is used on farmland needs to be assessed and addressed through risk management measures”.

With regards to contaminants in sludge, (e.g., organic compounds, microplastics etc.), the evaluation notes that further evidence is needed to fully understand how these contaminants behave when sludge is reused in agriculture and the likelihood of accumulation in soil to levels which may pose a risk to human health and the environment. Research would be needed on possible combined effects of several contaminants also. The evaluation notes that:

“currently, there lacks data on the impact of sludge application on land on the environment and the human health. There is no systematic and periodic evaluation of the environmental and health risks from sewage sludge management routes, neither at EU level nor consistently within the Member States.”

A preliminary assessment of policy options for a possible review of the SSD is set out in a report titled *“Feasibility study in support of future policy developments of the Sewage Sludge Directive (86/278/EEC)”*, published by the Joint Research Centre (JRC), the European Commission’s science and knowledge service, in 2023 (Egle, et al., 2023). The main problem identified in that study is that currently sewage sludge management practices may not be fully aligned with policy objectives aimed at achieving a high level of environmental and human health protection, and a more circular management where resources are retained in the nutrient cycle. The SSD has been proposed for review and, according to the draft Strategy, is expected to be updated in the coming years. Recently, an amendment to the SSD⁵ included a requirement for Member States to report the geographic location or geometry identifying the places where biosolids are reused on land. ÚÉ are working with the Department of the Climate, Energy and the Environment, (DCEE) and the Department of Agriculture, Food and the Marine (DAFM) to assist with this spatial data request.

4.3.2 The Water Framework Directive (2000/60/EC, 2000)

The Water Framework Directive (WFD) (2000/60/EC, 2000), as amended, requires all Member States to protect and improve water quality in all waters so that at least good ecological status can be achieved by 2015 or, at the latest, by 2027. It was given legal effect in Ireland by *inter alia* the European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003) as amended. The WFD applies to rivers, lakes, groundwater, transitional and coastal waters. The Directive requires that management plans be prepared on a river basin basis and specifies a structured method for developing these plans.

Member States are required to use their River Basin Management Plans (RBMPs) and Programmes of Measures (PoMs) to protect and, where necessary, restore water bodies in order to reach at least good status, and to prevent deterioration. Good status means both good chemical and good ecological status.

³ Described as follows in EC (2023a): “assessing coherence of the Directive with the EU wider policy objectives of the European Green Deal as well as possible inconsistencies and overlaps with other legislation”.

⁴ Described as follows in EC (2023a): “assessing whether the objectives and the regulatory tools of the Directive match current needs in view of the wider EU policy objectives, notably on circular economy, sustainability, resource efficiency and climate change.”

⁵ Regulation (EU) 2019/1010 of the European Parliament and of the Council of 5 June 2019 on the alignment of reporting obligations.

4.3.3 The Drinking Water Directive (2020/2184, 2020)

The recast Drinking Water Directive (rDWD) (2020/2184, 2020) is the EU's main law on drinking water. It concerns the access to and the quality of water intended for human consumption to protect human health. The EU adopted the rDWD in December 2020 and the Directive entered into force in January 2021. The rDWD aims to further protect human health through, for example, updated water quality standards and tackling pollutants of concern, such as endocrine disruptors and microplastics. The rDWD was given legal effect in Ireland by *inter alia* the European Union (Drinking Water) Regulations, 2023 (S.I. 99 of 2023), as amended. The key measures in the regulations include⁶:

- Overarching application of a risk-based approach to water safety;
- Updating the list of parameters monitored in drinking water;
- Implementation of a 'watch list' of parameters which are of concern in respect of impact on human health and their presence in drinking water;
- Minimum hygiene requirements for materials that come into contact with water;
- Minimum requirements for treatment chemicals and filter media that come into contact with water;
- Increasing access to water intended for human consumption in particular for vulnerable and marginalised groups;
- Information to the public on water quality;
- Requirement for water suppliers to assess water leakage levels in their distribution network;
- Broadening of the regulations concerning Penalties and Prosecutions to include offences in relation to pollution or contamination of a source of water intended for human consumption.

In addition, under the aforementioned Drinking Water Regulations (DWR), there is a requirement for a comprehensive risk assessment and risk management approach that encompasses all steps in water supply from catchment to consumer, with the inclusion of the requirement for catchment or raw water monitoring. UÉ is identified as the responsible body for undertaking the risk assessment and coordinating risk management for drinking water catchments associated with public water supplies. The risk assessment and risk management of all drinking water sources must be completed by July 2027 for the first time and every six years thereafter. UÉ has adopted the Drinking Water Safety Plan (DWSP) approach which is in line with the DWR and Drinking Water Source Protection Guidelines. The approach seeks to protect human health by identifying, assessing and managing risks to water quality and quantity; taking a holistic approach from source (catchment) to tap (consumer).

UÉ commenced the development of a new evidence-based approach to DWSPs for all water supply zones in 2018 and this work is still ongoing. It is a multi-barrier approach to managing risk to drinking water, takes a source to tap approach; by seeking to reduce the level of contamination entering water sources, applying robust treatment barriers at the water treatment plants, and having monitoring programmes to help validate performance. A barrier is defined as any action, process, procedure, standard or asset put in place across the entire system, from source to tap, to help achieve water of sufficient quality and quantity⁷.

4.3.4 The Nitrates Directive (91/676/EEC, 1991)

The Nitrates Directive (91/676/EEC, 1991), as amended, has been in place since 1991 and aims to protect water quality from pollution by agricultural sources and to promote the use of good farming practice. The Nitrates Directive forms an integral part of the Water Framework Directive and is one of the key instruments in the protection of waters from agricultural pressures. The Nitrates Directive requires Member States to undertake the following:

- Monitor waters and identify waters which are polluted or are liable to pollution by nitrates from agriculture;

⁶ Available at: <https://www.gov.ie/en/department-of-housing-local-government-and-heritage/press-releases/new-drinking-water-regulations-to-enhance-standards-from-source-to-tap/> [Accessed 30/05/2025].

⁷ Available at: <https://www.water.ie/conservation/protecting-water-sources/source-risk-assessment> [Accessed 11/03/2026].

Pre-Consultation NIS

- Identify the area or areas to which an action programme should be applied to protect water from pollution from nitrates from agricultural sources (note Ireland has applied its Nitrates Action Programme (NAP) on a country-wide basis, thus ensuring 100% territorial coverage);
- Develop and implement an action programme to reduce and prevent such pollution. This action programme must be implemented and updated on a four-year cycle;
- Monitor the effectiveness of the action programmes; and
- Report to the EU Commission on progress.

In response to the Nitrates Directive, the first Nitrates Action Programme (NAP) for Ireland was published as the European Union (Good Agricultural Practice for the Protection of Waters) Regulations ('The GAP Regulations') in 2006, with subsequent NAPs published in 2010, 2013, 2017, 2022 and 2025. The purpose of the NAP is to prevent pollution of surface waters and groundwater from agricultural sources and to protect and improve water quality; consistent with the requirements of the Nitrates Directive. The current Sixth NAP runs from 1 January 2026 to 31 December 2028, and includes a focus on nutrient management, knowledge transfer and advisory services, and compliance and enforcement, through a range of regulatory and non-regulatory measures. The European Union (Good Agricultural Practice for Protection of Waters) Regulations 2025 (S.I. No. 588/2025) give effect to the current Sixth NAP.

The landspreading of biosolids is regulated by the Department of Agriculture, Food and the Marine (DAFM), through the NAP and implementing GAP Regulations where it is considered an "organic fertiliser"⁸, as well as Local Authorities.

4.3.5 The Waste Framework Directive (08/98/EEC, 2008)

The Waste Framework Directive (08/98/EEC, 2008), as amended, sets the basic concepts and definitions related to waste management, including recycling. It requires of Member States that waste be managed without the following;

- Endangering human health and harming the environment;
- Risk to water, air, soil, plants or animals;
- Causing a nuisance through noise or odours;
- Adversely affecting the countryside or places of special interest.

The Directive emphasises a waste hierarchy which prioritises waste prevention, followed by preparation for reuse, recycling, recovery and disposal. The Waste Framework Directive also requires Member States to take measures to achieve specific waste reduction targets.

4.3.6 The recast Urban Wastewater Treatment Directive (2024/3019, 2024)

The Urban Wastewater Treatment Directive was first adopted in 1991 (91/271/EEC). The aims of the Directive are to protect the environment from the adverse effects of wastewater discharges from urban wastewater and wastewater from certain industrial sectors. The Urban Waste Water Treatment Directive sets standards to be met in the collection and treatment of wastewater as well as the monitoring requirements for wastewater discharges from urban areas. The Directive was updated and recast on 27th November 2024 and entered into force on 1st January 2025. Member States have until 30th June 2027 to transpose this legislation into national law. The recast Directive (rUWWTD) (2024/3019, 2024) addresses new sources of urban pollution, which have become more dominant (such as smaller cities, decentralised facilities, or stormwater) and new pollutants including microplastics and micropollutants (such as pharmaceuticals or cosmetics).

Some of the key obligations under the rUWWTD relating to wastewater sludge and bioresource management include energy and climate neutrality targets of 20% by 2030 and 70% by 2040 and increasing monitoring to include microplastics and greenhouse gas emissions (GHG) emissions. Increased circularity is also a key element of the rUWWTD, with new requirements introduced to recover valuable components from wastewater and sewage sludge, like phosphorus, a critical raw material in the EU.

⁸ Defined as "any fertiliser other than chemical fertiliser and includes livestock manure, dungstead manure, farmyard manure, slurry, soiled water, silage effluent, spent mushroom compost, non-farm organic substances such as sewage sludge, industrial by-products and sludges and residues from fish farms" in S.I. No. 588 of 2025.

Pre-Consultation NIS

The rUWWTD also sets out requirements for quaternary treatment for the removal of micropollutants and emerging contaminants at the larger sites, and other sites on a risk basis. The new regulation introduces the ‘polluter pays principle’ whereby producers of pharmaceuticals and cosmetics must cover at least 80% of additional costs for treating wastewater through an extended producer responsibility (EPR) scheme.

The rUWWTD also states that Member States should promote, as a priority, the control of pollutants at source to prevent the pollution of receiving water bodies. In particular, Member States should take preventive measures to limit the risk that intentionally and unintentionally released microplastics reach urban wastewater and sludge.

The following, extracted from the European Commission website⁹, summarises the updated rules of the rUWWTD:

- Inclusion of a broader number of areas including covering smaller agglomerations starting at 1,000 inhabitants within the Directive;
- Systematic monitoring of microplastics and PFAS (often referred to as forever chemicals) is now required, as well as monitoring of public health parameters;
- The costs of advanced treatment of wastewater to mostly be covered by the responsible industry (in line with the ‘polluter pays’ principle). The pharmaceuticals and cosmetics industries, whose products create the most micropollutants in wastewater, will be required to pay at least 80% of the cost for their removal;
- The new rules will drive the wastewater sector towards energy and climate neutrality. They will also improve the management of stormwater in cities;
- New requirements have been introduced to recover valuable components from wastewater and sewage sludge, like phosphorus;
- The Directive promotes stronger reuse of treated water, ensuring that no valuable resources are wasted;
- The Directive ensures access to sanitation in public spaces for the two million most vulnerable and marginalised people in the EU.

4.3.7 Soil Monitoring Law (2025/2360, 2025)

The EU Soil Strategy for 2030 was adopted in 2021 and sets out a framework to protect and restore soils and ensure they are used sustainably by 2050. A pillar of the EU Soil Strategy is to provide a legal framework for the protection of soils through the development of a soil monitoring law (EPA, 2024a). In December 2025, the Soil Monitoring Law entered into force. EU Member States must transpose the Directive's provisions into their national law by the 16th December 2028. The objective of the Directive is to:

“establish a solid and coherent soil monitoring framework for all soils across the Union, to reduce soil contamination to levels no longer considered harmful to human health and the environment, to continuously improve soil health in the Union, to maintain soils in a healthy condition and to prevent and address all aspects of soil degradation, with a view to achieving healthy soils by 2050 so that they can provide multiple ecosystem services on a scale sufficient to meet environmental, societal and economic needs, prevent and mitigate the impacts of climate change and biodiversity loss, and increase resilience against natural disasters and in terms of food security.”

The Directive lays down a framework for and measures on monitoring and assessment of soil health, soil resilience and management of contaminated sites. Management of contaminated sites follows a risk-based approach.

Of note is that the Directive does not impose an obligation on Member States to achieve healthy soils by 2050 or set intermediate targets. According to the Directive:

“The aspirational long-term objective of this Directive is to achieve healthy soils by 2050. In light of the limited knowledge regarding the condition of soils and regarding the effectiveness and costs of the measures to regenerate their health, this Directive focuses on establishing a soil monitoring framework and assessing the situation of soils throughout the Union. This Directive also includes support for soil health and soil resilience as well as for assessment and management of the risks of contaminated sites.

⁹ Available at: https://environment.ec.europa.eu/news/new-rules-urban-wastewater-management-set-enter-force-2024-12-20_en [accessed 20/01/2026].

Pre-Consultation NIS

However, it does not impose an obligation on Member States to achieve healthy soils by 2050 or set intermediate targets. As soon as the results of the first assessment of soil health and related trend analysis are available, the Commission should take stock of the progress made towards achieving the objectives of this Directive and assess the need for its possible amendment.”

4.4 Technical Strategies

In addition to specific actions within the draft Strategy (see **Section 4.5**), a number of technical strategies underlie the actions proposed. These relate specifically to (1) treatment infrastructure and processes, (2) transport and (3) reuse of bioresources, and are described below. The various bodies/authorities which have responsibility for key aspects of each technical strategy are summarised in **Table 4-1**.

Table 4-1: Roles and responsibilities associated with each technical strategy of the UÉ bioresource management process.

Technical Strategy	Responsibilities	Regulator	Key Legislation and Guidance (not exhaustive)
Treatment of sewage sludge for landspreading	Uisce Éireann treat sludge at WWTPs and comply with their obligations under the Waste Management (Use of Sewage Sludge in Agriculture) Regulations, 1998, as amended, to ensure that the sludge is appropriately treated.	Local Authority	Council Directive 86/278/EEC of 12 June 1986 on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture, as amended S.I. No. 148 of 1998 — Waste Management (Use of Sewage Sludge in Agriculture) Regulations, 1998 (as amended); S.I. No. 32/2010 - Waste Management (Registration of Sewage Sludge Facility) Regulations, 2010 Codes of Practice for the use of Biosolids in Agriculture, (2008)
Transport of sewage sludge/bioresources	Uisce Éireann or Contractors under contract to UÉ, transport sewage sludge/bioresources (e.g., from WWTP to storage facility).	EPA, DAFM, Local Authority	The Waste Management Act 1996 (as amended); The Waste Facility Permit Regulations (as amended); European Communities (Waste Directive) Regulations 2011 (S.I. No. 126/2011) as amended and Waste Management (Collection Permit) Regulations 2007 (S.I. No. 820/2007), as amended; S.I. No. 32/2010 - Waste Management (Registration of Sewage Sludge Facility) Regulations 2010; European Union (Good Agricultural Practice for Protection of Waters Regulations 2025 (S.I. 588 of 2025); Codes of Practice for the use of Biosolids in Agriculture, (2008)
Treated sewage sludge/bioresource reuse on agricultural land	Supplied by Uisce Éireann to contractors under contract. To ensure that all sludge treatment and reuse complies with the Code of Good Practice, auditing of contractor’s activities is carried out by UÉ. The timing of the audit is planned to allow auditing of activities during land spreading periods. UÉ also review	DAFM, Local Authority	Council Directive 86/278/EEC of 12 June 1986 on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture as amended; S.I. No. 148 of 1998 — Waste Management (Use of Sewage Sludge in Agriculture) Regulations, 1998 (as amended); European Union (Good Agricultural Practice for Protection of Waters Regulations 2025 (S.I. 588 of 2025); Codes of Practice for the use of Biosolids in Agriculture, (2008)

Pre-Consultation NIS

Technical Strategy	Responsibilities	Regulator	Key Legislation and Guidance (not exhaustive)
	Nutrient Management Plans.		

4.4.1 Treatment Infrastructure and Processes

At present UÉ are treating 100% of wastewater sludge generated, all of which is reused in agriculture. Wastewater sludge is normally separated from the treated effluent using gravity settlement. This produces a liquid wastewater which is further treated using mechanical, biological or chemical processes, or a combination of them, prior to recycling. These processes are aimed at removing water, thereby reducing sludge volume, and stabilising the organic matter. Wastewater sludge is dewatered, and then subsequently treated to produce a stabilised biosolid. Emerging wastewater sludge treatment processes have been developed, which largely relate to the pre-treatment technologies to improve Anaerobic Digestion (AD) processes (e.g., thermal hydrolysis, microbial hydrolysis, thermophilic digestion). Energy is recovered via AD processes at some WWTPs operated by UÉ. AD produces a methane rich biogas which is converted to heat and electricity and is subsequently reused within the WWTPs. Some larger WWTPs have Advanced AD (AAD) which incorporates the thermal hydrolysis process (THP) which enhances AD resulting in a higher biogas yield, increased energy, and reduces the sludge quantity by up to 50%.

Alternative Advanced Thermal Conversion (ATC) treatment technologies are emerging for innovative bioresources treatment such as hydrothermal carbonisation (HTC), pyrolysis, or gasification. Biochar and hydrochar, which are both byproducts of HTC, contain nutrients and can be used as a soil amendment and fertiliser. These treatment technologies are not yet implemented in Ireland (but see relevant actions in **Table 4-2**).

4.4.2 Transport of Wastewater Sludge and Bioresources

Transportation is a significant part of wastewater sludge and bioresources management in terms of environmental impacts, carbon footprint, and cost. In smaller WWTPs in Ireland, transport accounts for a substantially larger proportion of the costs associated with treatment. UÉ utilise licenced waste transport operators with full traceability and have standard operating procedures to optimise desludging and liquid sludge removal. UÉ Sludge Framework Contractors carry out all elements of the works related to the transportation of sludge, in accordance with current legislation, regulations and the requirements set out within the Codes of Good Practice for Use of Biosolids in Agriculture (Fehily Timoney & Company, 2008a; Fehily Timoney & Company, 2008b).

Where practicable, sludge is transported and spread on the nearest suitable spread lands to the source of the treated sludge.

Satellite Dewatering Centres (SDCs) and Bioresources Centres (BCs) are being used to improve operational efficiencies within the sludge management process. According to the draft Strategy, it is planned that the wastewater sludge from rural WWTPs will be directed to intermediate SDCs where sludge is dewatered prior to transfer to a regional BC for final treatment and stabilisation. The dewatering of sludge at the SDCs will reduce onward transport costs, transport emissions and traffic movements.

4.4.3 Reuse/Recycling of Bioresources

According to the draft Strategy, all the treated biosolid bioresources produced by UÉ are currently reused in agriculture in accordance with the Code of Good Practice for Use of Biosolids in Agriculture (Fehily Timoney & Company, 2008a).

The purpose of the Code of Good Practice for Use of Biosolids in Agriculture is to ensure that the safe reuse of bioresources as biosolids in agriculture will:

- Be compatible with good agricultural practice;
- Not pose a risk to human, animal or plant health;
- Maintain the integrity of the soil ecosystem;
- Avoid water pollution;

Pre-Consultation NIS

- Avoid air pollution; and
- Minimise public inconvenience.

According to the previous National Wastewater Sludge Management Plan (Irish Water, 2016), wastewater sludge/biosolids are typically spread on land used for fodder for animals as well as grassland. Pasture and horticultural crops are subject to greater legislative restrictions and as such are less suitable for use. There are spatial restrictions regarding the agricultural use of biosolids. These are in areas vulnerable to groundwater contamination (use of biosolids is not normally permitted in areas of extreme groundwater vulnerability) and in areas where naturally occurring cadmium and nickel levels in soils are high. These restrictions reduce the overall area of agricultural land potentially available for landspreading of biosolids.

4.5 Main Objectives of the Plan

UÉ have set out key actions, outlined in **Table 4-2** below, to achieve the strategic objectives of the draft Strategy. These actions build on the actions in the existing NWSMP and go further to ensure sustainable bioresources management. UÉ has committed that the Strategy will undergo regular reviews, every five years or sooner if required, to ensure it remains appropriate and fit for purpose.

The objectives, aims and actions for achieving the draft Strategy (**Table 4-2**), alongside the supporting text within the draft Strategy and the technical strategies that underlie the actions proposed, comprise the “Plan” subject to assessment in this NIS.

Table 4-2: Key Objectives, Aims and Actions for Achieving the Draft Strategy

Strategic Objective	Strategic Aim	Action
1 - Sustainable management of wastewater sludge and bioresources	Achieving Net Zero Carbon	<p>1.1 Implement Biogas Optimisation Programme and incorporate methane emissions monitoring and control into biogas producing sites.</p> <p>1.2 Development of heat strategies and support heat recovery.</p>
	Adopting Circular Approaches	<p>1.3 Continue to develop potential opportunities for Co-Digestion in line with development of National Policy or Legislation.</p> <p>1.4 Implement resource recovery technologies.</p> <p>1.5 Maximise circularity and valorisation of circular bioeconomy.</p> <p>1.6 Increase understanding of alternative outlets, market demand and specification requirements for these outlets.</p>
	Gaining value from innovation	<p>1.7 Carry out demonstration on Advanced Thermal Conversion (ATC) technology and based on outcome implement ATC technology.</p> <p>1.8 Continue to support current and future bioresources research projects, monitor specific evidence based findings and incorporate into risk assessment method.</p> <p>1.9 Invest in renewable energy optimisation and generation.</p>
	Securing long-term funding	<p>1.10 Quantify long term investment needs for our bioresource assets.</p>
Protect and restore our environment	Contributing to positive biodiversity	<p>2.1 Implement nature based solutions such as Sludge Reed Beds (SRBs) on smaller sites (<2k P.E.), and SRBs are considered on all capital projects.</p> <p>2.2 Manage our assets to ensure biodiversity 'net gain'.</p> <p>2.3 Implement actions from our 'Biodiversity Action Plan' in delivery of bioresources projects.</p>
	Meeting our commitments under the recast UWWTD (rUWWTD) and the Sewage Sludge Directive	<p>2.4 Manage wastewater sludge and bioresources throughout the asset lifecycle to meet our existing regulatory requirements.</p> <p>2.5 Ensure all new regulatory requirements of the rUWWTD are met e.g. enhanced monitoring, energy neutrality, and circular economy.</p> <p>2.6 We are engaging with Regulators and Stakeholders regarding the development of a revised Code of Good Practice for the Use of Biosolids in Agriculture.</p>

Pre-Consultation NIS

Strategic Objective	Strategic Aim	Action
		2.7 Implement National emerging contaminants monitoring programme and carry out additional analysis as needs emerge.
	Protecting our water and land environment	<p>2.8 Continue on-going regulatory monitoring and UÉ traceability data collection.</p> <p>2.9 Implement a National Biosolids Assurance Scheme.</p> <p>2.10 Engage with key stakeholders and consult on PFAS limits.</p> <p>2.11 Implement alternative uses if needed.</p> <p>2.12 Bioresources response plan to be reviewed and further developed to manage land outlet.</p> <p>2.13 Promote source control management, advocating legislation around source control and improving wastewater sludge quality.</p> <p>2.14 Carry out risk assessments for industrial / pharmaceutical effluent discharging into our wastewater treatment plants.</p> <p>2.15 Provide storage facilities for treated bioresources nationally.</p>
3 - Support our communities, growth and the bioeconomy	Engaging with communities	3.1 Develop a culture of acceptance and community education and awareness regarding quality assurance and circularity of bioresources.
	Supporting the development of the circular bioeconomy	3.2 Engage with EU, regulators and key stakeholders regarding the development of the proposed new EU Circular Economy Act.
	Providing for growth	<p>3.3 Embed growth and demand analysis capability to forecast and plan for future investment requirements.</p> <p>3.4 Engage and collaborate with key stakeholders to support local, regional and national planning policy.</p>
4 - Efficient operation of wastewater sludge and bioresources centres	Managing our assets	<p>4.1 Phase out leachate acceptance at our wastewater treatment plants in consultation with Regulators, Local Authorities and waste operators.</p> <p>4.2 Continue to utilise licenced waste transport operators and auditing of contractors to ensure compliance with Standard Operating Procedure (SOP).</p> <p>4.3 Review dry solids monitoring on all new and upgraded wastewater sludge treatment assets to improve dewatering quality.</p> <p>4.4 Review and update Standard Operating Procedures (SOPs) for wastewater sludge and bioresource treatment assets.</p>
	Ensuring efficient transportation	4.5 Continue to develop a National Bioresource Decision Support Tool, optimising low carbon transport.
	Implementing efficient technologies	4.6 Implement sustainable efficient pre-treatment drying technology in parallel with ATC to optimise resource recovery.

5 SCIENTIFIC EVIDENCE BASE OF ASSESSMENT

5.1 Overview

This section compiles the scientific evidence base used to assess the potential impacts and effects of the draft Strategy, with a focus on European Sites and their qualifying interests.

A comprehensive, thorough and multi-faceted evidence base is presented, which sets out the regulatory context, baseline environmental conditions in Ireland, known threats and pressures affecting protected habitats and species, and plausible sources and pathways by which the technical strategies associated with the draft Strategy (treatment, transport and reuse/recycling) could present a risk to European Sites.

These elements are addressed in **Section 5.2** to **Section 5.4** and are summarised below.

Existing Measures in Place (Section 5.2)

- There are significant EU and national legislative and policy frameworks to control and manage the biosolids management process in Ireland covering treatment, transport and reuse/recycling.
- The evidence base recognises high levels of monitoring and controls currently in place.
- At the same time, it is acknowledged that national authorities (EPA and expert working groups) have flagged the need to update guidance and legislation to address emerging environmental concerns relating to biosolids.

Baseline Environmental Context (Section 5.3)

- As part of the evidence base, consideration has been given to the baseline condition/state of multiple relevant receptors, namely water, soil, air, and habitats and species protected under the Birds and Habitats Directives.
- The use of sludge relative to other fertilisers in Ireland is discussed, mindful of the fact that sludge comprises a relatively small proportion of total fertiliser use in Ireland.
- Relevant pressures/threats (as reported under Article 17 of the Habitats Directive and Article 12 of the Birds Directive) broadly associated with the bioresources management process, and the protected habitats and species for which the relevant pressures/threats are listed, are identified.
- Overall, where data are available, the state/condition of relevant receptors is generally unsatisfactory, particularly in relation to both water quality and the overall status/trends of protected habitats and species. Importantly, it should be noted that this is a national issue arising as a result of multiple stressors.

Potential Ecological Impacts and Effects of the Bioresources Management Process (Section 5.4)

- The assessment addresses the potential impacts and effects for the three technical strategies associated with the draft Strategy, namely: (1) treatment infrastructure and processes; (2) transport; (3) recycling/reuse of bioresources (agricultural application of biosolids).
- Recycling/reuse of biosolids on agricultural land is identified as a key technical strategy requiring careful consideration, primarily because recent studies/risk assessments have identified the presence of various contaminants in sludge which are not currently regulated under the SSD or national legislation (e.g., microplastics, organic contaminants). Since 100% of treated wastewater sludge is currently reused on agricultural land in Ireland, the potential ecological implications of this practice requires careful assessment.
- Although existing measures and regulations reduce the potential environmental risks associated with landspreading of biosolids, potential risks to European Sites and their qualifying interests have been identified. The main risks identified are:
 - potential losses of nutrients to the environment (e.g., air/water) if landspreading is not managed appropriately and in accordance with legislative, policy and guidance/best practice, and;
 - the potential for runoff or leaching of contaminants, some of which are not regulated (e.g., microplastics, organic contaminants) to the wider environment, particularly to waterbodies.
- Importantly, the assessment recognises ongoing research and uncertainty in the evidence base with respect to some impact sources and pathways. As many of the contaminants of concern are “emerging”, their impacts and effects on ecological receptors are not yet fully understood.

5.2 Existing Measures in Place

The use of sewage sludge in agriculture is highly regulated in Ireland, with high levels of monitoring and control. There is a significant suite of regulatory controls in place with respect to (i) treatment infrastructure and processes, (ii) transport and (iii) reuse and recycling, all of which are discussed below. This regulatory framework has informed the draft Strategy and also provides a framework, where necessary, for any mitigations which this assessment identifies as necessary to address any actual or potential adverse effects on European Sites.

5.2.1 Treatment Infrastructure and Processes

Treatment infrastructure and processes for wastewater sludge are regulated under various legislation and guidelines, including but not limited to:

- The Sewage Sludge Directive (SSD) (86/278/EEC, 1986) and amendments;
- The recast Urban Wastewater Treatment Directive (2024/3019, 2024);
- The Waste Framework Directive (2008/98/EC) and amendments;
- S.I. 588 of 2025 European Union (Good Agricultural Practice for Protection of Waters) Regulations 2025;
- S.I. No. 148 of 1998 — Waste Management (Use of Sewage Sludge in Agriculture) Regulations, 1998, as amended;
- S.I. No. 32/2010 - Waste Management (Registration of Sewage Sludge Facility) Regulations 2010;
- Code of Good Practice for the Use of Biosolids in Agriculture – Guidelines for Farmers (Fehily Timoney & Company, 2008a);
- Code of Good Practice for the Use of Biosolids in Agriculture – Guidelines for Local Authorities and Wastewater Treatment Plant Operatives (Fehily Timoney & Company, 2008b).

A number of treatment processes provide pathogen reduction to ensure the biosolids are suitable for reuse in agriculture. The sludge treatment processes used in Ireland include the following:

- Mesophilic Anaerobic Digestion with pre- or post-pasteurisation
- Thermophilic Anaerobic Digestion
- Thermophilic Aerobic Digestion
- Composting
- Alkaline Stabilisation
- Thermal Drying

As noted in the draft Strategy, these treatment processes have all been demonstrated to achieve 99.9999% (or 6 log) reduction in indicator pathogens. Nature-based solutions (e.g., integrated constructed wetlands, sludge drying reed beds (SDRBs)) are also implemented at some WWTPs for the treatment of wastewater sludge. Anaerobic digestion and lime stabilisation are the main wastewater sludge stabilisation methods at UÉ plants.

The Code of Good Practice for Use of Biosolids in Agriculture requires the biosolids producer to guarantee that biosolids have been treated sufficiently to attain defined chemical, physical and microbiological standards. The treatment standards under the Code of Practice state if sludge arising from wastewater treatment is to be used as a fertiliser in an agricultural setting, it must receive the appropriate treatment to ensure that it attains the standards necessary to be classified as biosolids. It states that untreated wastewater sludge should not be landspread or injected into soil.

As described in **Section 4.3.6**, the UWWTD was recast in 2024 (referred to as the rUWWTD) and came into force on the 1st January 2025 to address new sources of urban pollution and new pollutants including microplastics and micropollutants (such as pharmaceuticals or cosmetics). The rUWWTD also sets out requirements for quaternary treatment for the removal of emerging contaminants and micropollutants at the larger sites, and other sites on a risk basis. The ‘polluter pays’ principle is applied in the rUWWTD, which ensure that the costs of advanced treatment will mostly be covered by the responsible industry, rather than by water tariffs or public budget. ‘Quaternary treatment’ is defined in the Directive as “*treatment of urban*

Pre-Consultation NIS

wastewater by a process which reduces a broad spectrum of micropollutants in urban wastewater". Whereas the implementation of quaternary treatment will positively affect the quality of effluent from WWTPs, according to Huygens, et al. (2022) the possible implementation of more advanced (quaternary) wastewater treatment is not expected to alter the quality of (primary and secondary) sludge brought to agricultural land. However, the rUWWTD also states that Member States should promote, as a priority, the control of pollutants at source to prevent the pollution of receiving water bodies. This will also serve to improve the quality of wastewater sludge.

There are currently no limits for levels of organic pollutants specifically relating to biosolids used in agriculture. Pharmaceutical and personal care products (PPCPs), as well as microplastics are also not regulated in relation to biosolids (**Table 5-1**). However, it should be noted that pollutants associated with the greatest risks to the environment are already subject to actions and restrictions under the POPs and REACH Regulation (EC, 2023a). In addition, Uisce Éireann are required to carefully assess and regulate all discharges (e.g., trade effluent) to their sewer network in order to ensure that public health, operations and the environment are fully protected. It is necessary to have a trade effluent licence granted by Uisce Éireann or a licence granted by the Environmental Protection Agency to discharge trade effluent to the sewerage network¹⁰. Furthermore, the European Commission have adopted measures that restrict microplastics intentionally added to products under the REACH Regulations¹¹.

¹⁰ Available at: <https://www.water.ie/business/trade-effluent/about> [Accessed: 12/02/2026].

¹¹ Available at: https://ec.europa.eu/commission/presscorner/detail/en/ip_23_4581 [Accessed: 12/02/2026].

Pre-Consultation NIS

Table 5-1: List of Potential Contaminants Found in Biosolids, and Their Regulation for Use in Agriculture*.

Potential Contaminants in Biosolids (not exhaustive)	Regulation for Use in Agriculture	Other Relevant Regulation	Are limits/standards set for use in agriculture?
Cadmium	SSD; S.I. No. 148/1998 (as amended);	REACH Regulation (Regulation (EC) 1907/2006) (as amended)	Yes
Copper	Code of Good Practice for the Use of Biosolids in Agriculture		
Nickel			
Lead			
Zinc			
Mercury			
Chromium			Yes, limits set for Chromium in the Code of Good Practice and S.I. No. 267/2001
Pathogens (faecal coliform, <i>Salmonella</i> sp.)	Code of Good Practice for the Use of Biosolids in Agriculture	-	No, however the Code of Good Practice sets out monitoring requirements for these contaminants.
Polychlorinated biphenyls (PCB)		POPs Regulation (Regulation (EU) 2019/1021) (as amended); REACH Regulation (Regulation (EC) 1907/2006) (as amended)	
Polychlorinated dibenzodioxins/dibenzofurans (PCDD/F)			
Polyaromatic Hydrocarbons (PAH)			
Nonylphenol		REACH Regulation (Regulation (EC) 1907/2006) (as amended)	
Other Persistent organic pollutants (POPs) including PFAS	None	rUWWTD, POPs Regulation (Regulation (EU) 2019/1021) (as amended), REACH Regulation (Regulation (EC) 1907/2006) (as amended)	No. However, rUWWTD requires monitoring of PFAS in wastewater.
Pharmaceuticals & personal care products		rUWWTD; REACH Regulation (Regulation (EC) 1907/2006) (as amended)	
Microplastics		REACH Regulation (Regulation (EC) 1907/2006) (as amended); rUWWTD	No. However, rUWWTD requires monitoring of microplastics in sludge (for all agglomerations of above 10,000 PE), and better controls at source. REACH Regulations restrict microplastics intentionally added to products.

* The list provided for contaminants, as well as other relevant regulation, is not exhaustive.

5.2.2 Transport

Transport associated with sludge/biosolids management is regulated under the *Code of Good Practice for Use of Biosolids in Agriculture*, The Waste Management Act 1996 (as amended) and the Waste Facility Permit Regulations 2007 (S.I. No. 821/2007), as amended.

According to the draft Strategy, UÉ Sludge Framework Contractors carry out all elements of the works related to the transportation of sludge to UÉ satisfaction and in accordance with current legislation, regulation and the requirements set out within the Codes of Good Practice for Use of Biosolids in Agriculture.

The Waste Management Act 1996 (as amended) is the primary legislation governing waste management in Ireland. It provides the legal framework for the collection, transport, and disposal of waste. Further legislation includes but is not limited to European Communities (Waste Directive) Regulations 2011 (S.I. No. 126/2011) as amended, Waste Management (Registration of Sewage Sludge Facility) Regulations 2010 (S.I. No. 32/2010), and Waste Management (Collection Permit) Regulations 2007 (S.I. No. 820/2007) as amended.

Under the Code of Practice, transportation of liquid biosolids should be delivered to farms within a closed tanker while biosolids of a dry solids content >25% may be delivered in a covered skip or trailer. The type and size of the chosen vehicle should be suitable for the planned task, and transport routes should be carefully planned. It also states that should a spillage occur during transportation; it must be cleaned up immediately, and that spillages cannot be allowed to enter watercourses and ditches. In the event of a spillage on a public road, the Code of Good Practice for Use of Biosolids in Agriculture states that both the Local Authority headquarters and the Gardaí must be contacted as soon as possible.

UÉ have developed a National Bioresources Strategic Decision Support Tool (DST). The DST enables UÉ to evaluate and optimise transport strategies.

5.2.3 Reuse/Recycling

Monitoring is carried out on treated biosolids before reusing in agriculture in accordance with the requirements in the Codes of Good Practice for Use of Biosolids in Agriculture. This monitoring includes for nutrients (nitrogen, phosphorus, potassium), pathogens, heavy metals, and POPs (**Table 5-1**). Also, Nutrient Management Plans (NMP) are required to manage the application rates of nutrients. Furthermore, the SSD, implementing Waste Management (Use of Sewage Sludge in Agriculture) Regulations 1998, as amended, and Code of Good Practice for Use of Biosolids in Agriculture set out various conditions under which biosolids may be landspread, and include factors relating to land suitability.

The Waste Management (Use of Sewage sludge in Agriculture) Regulations, 1998 as amended set limits for the concentration of seven heavy metals in sewage sludge intended for agricultural use and in biosolids-amended soils (cadmium, copper, nickel, lead, zinc, mercury and chromium) and bans the use of sewage sludge that results in concentrations of these heavy metals in soil exceeding set limit values. The limit value concentrations focus on concentrations of heavy metals in soil (in a representative sample of soil with a pH of 6 to 7) and heavy metal concentration in sludge for use in agriculture. In addition, limit values for the amount of heavy metals which may be added annually to agricultural land, based on a 10-year average, are stipulated. The Code states that care must be taken that additional metals applied to the soil as a result of landspreading of biosolids will not adversely affect soil, plant, animal or human health. This can be ensured by adhering to the land usage constraints in the Code of Practice and by controlling the annual average addition of metal to land over a 10-year period and not applying biosolids to land in which heavy metals are already present in high concentrations.

Buffer strips that must be observed when landspreading biosolids are also specified in the Code of Good Practice and in S.I. 588 of 2025 (European Union (Good Agricultural Practice for Protection of Waters (GAP)) Regulations 2025). These are set out in **Table 5-2** and text below.

Pre-Consultation NIS

Table 5-2: Buffer Strips to be Observed During the Landspreading of Biosolids. Extracted from Fehily Timoney & Company (2008a).

Feature	Buffer zone (m)
Sensitive buildings (hospitals, schools & churches)	200
Dwelling houses*	100
Lakes and main river channels*	20
Small watercourses*	10
Public roads*	10
Domestic wells*	50
Public water supplies*,**	50 - 300

*Specified distances to be increased if the gradient >6%.

**The appropriate distance depends on vulnerability and direction of groundwater flow.

The nutrient needs of plants must be considered as part of landspreading practices as part of the SSD and implementing Waste Management (Use of Sewage Sludge in Agriculture) Regulations. An amendment to the Use of Sewage Sludge in Agriculture Regulations (S.I. No. 267/2001) also sets out that landspreading must be in accordance with a Nutrient Management Plan.

A multi stakeholder working group including UÉ was set up in 2024 to review and update the Codes of Good Practice for Use of Biosolids in Agriculture to consider developments in monitoring requirements and technologies.

Currently, the application of fertilisers onto agricultural lands is regulated by S.I. No. 588 of 2025 (European Union (Good Agricultural Practice for Protection of Waters (GAP)) Regulations 2025), under which “sludge” is considered a fertiliser. The GAP Regulations set limits and buffer zones that must be adhered to during landspreading. Specific nutrient application limits and buffers relating to watercourses are listed under Part 4 *Prevention of water pollution from fertilisers and certain activities* such as:

- Organic fertiliser or soiled water shall not be applied to land within;
 - 200 m of the abstraction point of any surface waters, borehole, spring or well used for the abstraction of water for human consumption in a water scheme supplying 100 m³ or more of water per day or serving 500 or more persons,
 - 100 m of the abstraction point (other than an abstraction point specified in paragraph (a)) of any surface waters, borehole, spring or well used for the abstraction of water for human consumption in a water scheme supplying 10 m³ or more of water per day or serving 50 or more persons,
 - 20 m of a lake shoreline or a turlough likely to flood,
 - 5 m of any surface waters (other than those listed above)¹²,
 - notwithstanding sub-article (2)(f), organic fertiliser or soiled water shall not be applied to land within 10 m of any surface waters where the land has an average incline greater than 10% sloping towards water.

The above list of buffers is not exhaustive and further detail of all limits and buffers can be found in the GAP Regulations. Additionally, the Regulations provide timeframes for which the application of fertilisers to land is prohibited such as;

- 1st October to 15th January in the case of the 1st application of organic fertiliser (other than farmyard manure) (for counties Clare, Galway, Kerry, Limerick, Longford, Louth, Mayo, Meath, Roscommon, Sligo and Westmeath) and 1st October to 12th January in the case of the application of organic fertiliser (other than farmyard manure) (for counties Carlow, Cork, Dublin, Kildare, Kilkenny, Laois, Offaly, Tipperary, Waterford, Wexford and Wicklow).

¹² Note the waterbody buffer specified in the Code of Practice is greater (see Table 5-2).

Pre-Consultation NIS

Under Part 3 *Nutrient Management* of the GAP Regulations, a restriction regarding the timing of sewage sludge application to specific lands are included in the Regulations, namely:

- Notwithstanding, sub-paragraph (1)(c) with the exception of arable land being sown to brassica spp or grass crops by 15 September, post-harvest application of organic fertiliser in the form of sewage sludge shall be prohibited in the Barrow Catchment and the Slaney & Wexford Harbour Catchment with effect from 1 January 2028.

Finally, in accordance with the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended), certain activities or operations which have the potential to damage a European Site can only be carried out within the European Site with permission from the Minister. These are known as “activities requiring consent” or ARCs. The ARCs attached to a European Site depend on the habitats and/or species for which the site is designated. If a European Site has been formally designated by statutory instrument (S.I.), the ARC or ARCs attached to that site are included as a schedule to the S.I. If the European Site has not yet been formally designated by S.I., information on the ARC(s) attached to that site will have been included in a ‘site pack’ sent to the landowner (and where known, the relevant occupier or user of the land) at the time of public notification of the Minister’s intention to designate the site as a SAC or classify the site as a SPA¹³. The most relevant ARC to this NIS is **ARC-12: Applying inorganic or organic fertiliser, including slurry and farmyard manure.** [*Consent is not required for these activities on established reseeded grassland or cultivated land provided it is greater than 20m from a river, stream or floodplain; or greater than 50m from a wetland, lake, turlough or pond.*].

5.3 Baseline Environmental Context

5.3.1 Sludge Use Relative to Other Fertiliser Use in Ireland

Sludge comprises a relatively small proportion of total fertiliser use in Ireland. Uisce Éireann produces approximately 70,000 tonnes dry solids (tds) of biosolids annually, 100% of which is reused on agricultural land. This is expected to increase to greater than 96,000 tds by the year 2040 as new and upgraded plants are completed (Anon, 2025). By way of comparison, total mineral fertiliser sales in 2024 amounted to 1.2 million tonnes, of which the N content was 310,411 tonnes and P content was 28,736 tonnes¹⁴. Approximately 40 million tonnes of animal manures are produced each year in Ireland, with grasslands ultimately receiving the bulk of these manures (EPA, 2025a).

According to the Sludges, Biosolids and other Organic Fertilisers Working Group (Anon, 2025):

“Of all the nitrogen that goes onto land, 57% of it comes from livestock manure, 38% is from chemical fertiliser, and a small proportion – estimated at approximately 5% – comes from sewage and other sludges.”

The report also notes that:

“Although the nutrient load being applied to land nationally from sludges is low (approximately 5% of the national nitrogen load), land spreading may be concentrated on a small number of farms and therefore may pose a more significant risk to individual waterbodies.”

The agricultural pressures discussed in subsequent sections and flagged in **Table 5-3** and **Table 5-4** below should be considered within this context – i.e., sludge comprises a relatively small proportion of total fertiliser use in Ireland, but land spreading may be concentrated on a small number of farms and therefore may pose a greater risk to individual waterbodies.

Furthermore, it is worth noting that using sludge in agriculture generally has a net negative carbon footprint, due, amongst others to the sequestration of CO₂ in soils and its potential to substitute mineral fertilisers, which are produced through energy-intensive processes (EC, 2023a).

¹³ Available at: <https://www.npws.ie/farmers-and-landowners/activities-requiring-consent> [accessed 12/02/2026].

¹⁴ CSO data, available at: <https://www.cso.ie/en/releasesandpublications/ep/p-fsa/fertilisersales2024/> [accessed 08/01/2026].

5.3.2 Geographic Context

Ireland's main geographical features include low central plains surrounded by coastal mountains. The latest CORINE information available for 2018 shows that agriculture is the dominant national land cover type, representing almost 70% of the national area in 2018¹⁵. There are over 12,000 lakes in Ireland, covering approximately 2% of the land area (Kelly-Quinn, et al., 2020). An extensive river network has been mapped, and the majority of this network comprises small 1st to 2nd order streams. Hundreds of short streams flow from the coastal mountains to the sea, many less than 5 km in length (Kelly-Quinn, et al., 2020). The ten largest river catchments on the island of Ireland are the Shannon, Bann, Erne, Suir, Blackwater (Munster), Corrib, Barrow, Foyle, Boyne, Nore and Slaney. The listed river catchments wholly within the Republic of Ireland are all associated with at least one European Site (e.g., Munster Blackwater (Cork/Waterford) SAC, River Barrow and River Nore SAC, Lower River Suir SAC, Lower River Shannon SAC, River Boyne and River Blackwater SAC, Lough Corrib SAC).

5.3.3 Water Quality

There has been an ongoing pattern of declines in water quality in Ireland since the first assessment of ecological status was undertaken in the period 2007-2009, (EPA, 2025b) despite the targets set out by the WFD. The EPA's Water Quality in Ireland 2019-2024 report (EPA, 2025b) noted that overall there has been a net decline in water quality. Fifty-two percent of surface waters are in high or good ecological status and the remaining 48% are in moderate, poor or bad status. The main causes of unsatisfactory water quality in Ireland are run-off of nutrients, sediments and pesticides from agricultural land and farmyards; hydromorphological pressures (e.g., land drainage, dredging, barriers); discharges of poorly treated sewage from urban waste water treatment plants, domestic treatment systems and storm water overflows; run-off from hard surfaces in urban environments of sediment and contaminant loaded water; and run-off of nutrients and sediment from forestry operations (EPA, 2025b).

The Catchment Science and Management Unit of the EPA published a report regarding the impacts of agricultural pressures on water quality in Ireland (EPA, 2024b). Agriculture is the most common land use in Ireland, covering approximately 70% of the country, the majority of which is in pasture. Waterbodies are categorised as being 'At Risk' of not achieving their WFD objectives where the monitoring data shows evidence that water quality is impacted, and actions are required to deliver water quality improvements. Agriculture has been identified as the most prevalent significant pressure, impacting over 1000 waterbodies or approximately 60% of all waterbodies 'At Risk' of not achieving their environmental objective under the WFD.

Loss of excess nutrients, particularly nitrates and phosphates from chemical and organic fertilisers is associated with poor water quality. Free draining soils facilitate the loss of nitrates from fertiliser, which can enter shallow ground waterbodies before discharging to connected river systems and ultimately estuarine and coastal water bodies. For phosphorus, the primary pathway associated with fertiliser use is overland flow from soils with impeded drainage. The management of excess phosphorus is typically the main issue for rivers and lakes, whereas management of excess nitrogen is typically associated with groundwaters, estuaries and coastal waters (EPA, 2024b). The impacts of nitrates on estuaries and coastal waters are particularly notable in the south and southeast of the country.

Chemical substances such as industrial chemicals, pesticides and metals can also affect the status of waterbodies. Waterbodies polluted by these substances are identified by the EPA through assessment of chemical status. Waterbodies are monitored for the relevant substances by the EPA. Where concentrations in excess of the environmental quality standard (EQS) (either within the water, aquatic biota or both) are found for one or more substance the waterbody is deemed to have failed to achieve good chemical status. Chemical substances that persist in the environment many years after their use has ceased (e.g. mercury and Poly Brominated Diphenyl Ethers (PBDEs) in fish tissue) are known as ubiquitous substances (EPA, 2025b). Chemical status is reported with and without ubiquitous substances. All surface water bodies failed to achieve good chemical status in 2019-2024 when the assessment included ubiquitous substances. When ubiquitous substances (PBDEs and mercury in fish) were excluded, only 18% of surface water bodies failed to achieve good chemical status (EPA, 2025b). These EQS exceedances were for PAHs, mercury in water,

¹⁵ Available at: [https://www.epa.ie/who-we-are/our-services/monitoring--assessment/assessment/irelands-environment/land--soil/current-trends-land-and-soil/#:~:text=The%20most%20recent%20assessment%20\(CORINE,%25\)%20and%20forestry%20\(9.5%25\).](https://www.epa.ie/who-we-are/our-services/monitoring--assessment/assessment/irelands-environment/land--soil/current-trends-land-and-soil/#:~:text=The%20most%20recent%20assessment%20(CORINE,%25)%20and%20forestry%20(9.5%25).) [Accessed 20/01/2025].

Pre-Consultation NIS

cadmium, nickel, lead, cypermethrin, and perfluoro-octanyl sulphonic acid (PFOS) in water and Heptachlor in biota. In total 124 EQS exceedances were found in the 96 water bodies.

5.3.4 Soil Health

Soil health is vital to biodiversity, plant growth, water quality regulation and ecosystem function. The EPA recently published its latest report on ‘Ireland’s State of the Environment’ (EPA, 2024a) which contains a detailed chapter on soils in Ireland. According to the report, a review of Irish soil research and data from 2013 to 2021 identified major gaps in our knowledge of Ireland’s soils, with current research biased towards the collection of data on soil pH and nitrogen content and that agricultural soils were studied more than urban or contaminated soils. Some of the threats to soil health in Ireland, based on Irish studies or indicative (modelled) data from the EU Soil Observatory, include soil erosion, compaction, loss of soil organic carbon, excess nutrient content in soil, soil contamination, loss of soil biodiversity and soil sealing.

Ireland’s primary source of soil information is the Irish Soil Information System, which identifies Ireland’s main soil classes. Although Irish soils are well classified, a comprehensive baseline of soil health in Ireland is not available at present. At EU level, it is estimated that 60 to 70% of the soils in the Union are degraded and continue to deteriorate¹⁶. The implementation of the Soil Monitoring Law (see **Section 4.3.7**) will advance the knowledge of soil health at a national level.

5.3.5 Air Quality

Ireland’s air quality is compliant with EU standards; however, it is not on track to reach the 2026 targets set out in the recently published Clean Air Strategy (EPA, 2023a). The Clean Air Strategy provides a policy framework necessary to identify and promote the integrated measures across government policy that are required to reduce air pollution and promote cleaner ambient air (Government of Ireland, 2023).

Sewage sludge applied to soils accounts for a small proportion of nitrogen oxides and total ammonia emissions in the agricultural sector (more detail in **Section 5.4.2.1**). Agricultural activities, in general, including the use of organic and inorganic nitrogen fertilisers, are major sources of nitrogen oxide gases (36.4%) and account for almost all (approximately 99%) ammonia air pollutants in Ireland (EPA, 2024a). Livestock production accounts for the bulk of national total ammonia emissions in Ireland. For example, in 2022, manure management, animal manure applied to soil and nitrogen from urine and dung deposition by grazing animals combined accounted for c. 85% of the national total (Hyde, et al., 2024).

Nitrogen dioxide is one of the most significant pollutants to Irish air quality and transport (petrol and diesel engines) is the main source (EPA, 2023a).

5.3.6 Conservation Status of EU Protected Habitats and Species

The most recent Article 17 report from the National Parks and Wildlife Service (NPWS), detailing the conservation status in Ireland of habitats and species listed in the EU Habitats Directive (92/43/EEC) was published in 2025 (NPWS, 2025a). Under the Habitats Directive, each Member State is obliged to undertake surveillance of the conservation status of the natural habitats and species in the Annexes and under Article 17, to report to the European Commission every six years on their status and on the implementation of the measures taken under the Directive. **Appendix A** sets out a summary of the conservation status of each habitat and species from 2007 to 2025. The assessments are based on data collected across the whole national territory and therefore include many areas that are undesignated for nature protection (NPWS, 2025a).

Among the key findings from Ireland’s most recent Article 17 reporting relevant to this assessment are:

- With respect to habitats, 90% are at “unfavourable” status (48% “bad” and 42% “inadequate”; respectively). 51% of habitats are demonstrating ongoing deteriorating trends.
- With respect to species, 58% of species were assessed as “favourable”, 32% “unfavourable” (20% “bad and 12% “inadequate”) and 10% “unknown” status. 70% of species are demonstrating stable or improving trends while 18% demonstrate ongoing deteriorating trends.

¹⁶ Available at: https://environment.ec.europa.eu/topics/soil-health/soil-monitoring-law_en [Accessed 20/01/2026].

5.3.7 Threats and Pressures Affecting EU Protected Habitats and Species

5.3.7.1 Annex I Habitats & Annex II Species

The Article 17 reports from the NPWS lists the current pressures and threats of protected habitats (NPWS, 2025b) and species (NPWS, 2025c). Some of the key findings from Ireland’s most recent Article 17 reporting in relation to pressures and threats relevant to this assessment are detailed below and summarised in **Table 5-3**. It should be noted that the below information is provided for background context on the status of Annex I habitats and Annex II species in Ireland. More detailed consideration of the potential impacts of bioresources management is provided in **Section 5.4**. It should be noted that the various pressures and threats relating to agricultural practices highlighted below are broad in nature, and arise from multiple sources of which landspreading of biosolids comprises only one relatively small part at a national scale (see **Section 5.3.1**). For example, “PA13 Application of natural or synthetic fertilisers on agricultural land” comprises pollution from agricultural activities including landspreading of animal slurry, mineral fertilisers, manure, biosolids etc.

Habitats

- Pressures and threats are recorded in 54 of the 59 habitats assessed. 69% of habitats are impacted by pressures relating to agricultural practices and the pressure is ranked as high importance in more than 50% of habitats. “PA17 Agricultural activities generating pollution to surface or ground waters” is recorded in 39% of habitats impacted by agriculture. The habitats affected by pollution to surface or ground waters from agriculture include marine, coastal, upland, fen, lake or other groundwater-dependent habitats (these are estuaries, tidal mudflats and sandflats, lagoons, large shallow inlets and bays, salicornia mud, Atlantic salt meadows, oligotrophic isoetid lake habitat, slender naiad-type lakes, hard-water lakes, rich pondweed lake habitat, acid oligotrophic lakes, turloughs, vegetation of flowing waters, transition mires, cladium fens, petrifying springs, alkaline fens and are set out in **Table 5-3**).
- Quantitative analysis of the proportion of habitat exceeding Nitrogen deposition thresholds arising from “PA18 Agricultural activities generating air pollution” has highlighted blanket bog, transition mires, Rhynchosporion depressions, dry heath, alpine heath and wet heath as particularly vulnerable to this type of pollution.

Species

- Impacts from agricultural activities, and to a lesser extent forestry, are reported as having a negative effect on a wide range of species, including fish, molluscs, terrestrial mammals and vascular plants. This is because activities such as drainage, fertiliser application and clear-felling, though implemented at relatively local levels, may influence a much wider area.
- The agriculture category represents the highest percentage of high-importance pressures relative to other categories for species, with the incidence predicted to increase over the next 12 years. This has been linked to the threat from fertiliser and pollution on selected fish species (see **Table 5-3**).

There are specific pressures and threats of relevance to the objectives of the draft Strategy. These threats and pressures, and the Annex I habitats and Annex II species for which the pressure or threat is listed are set out in **Table 5-3**. Pressure/threat data for Annex I habitats and Annex II species was taken from NPWS Article 17 reporting (NPWS, 2025b; NPWS, 2025c). The key issues associated with sludge management and biodiversity relate to:

- Pollution (e.g., nutrient and heavy metal losses) of air, soil and water as a result of reuse of treated sludge onto agricultural and non-agricultural lands leading to impacts on habitats or species;
- Species loss and/or disturbance or habitat loss or deterioration associated with new or expanded sludge infrastructure, transport of sludge, disposal, or reuse of sludge.

5.3.7.2 Protected Bird Species

Every six years, Member States must report on the population status of species protected under the Birds Directive (2009/147/EC) that are present on their territory. This is referred to as Article 12 reporting, and the most recent report is for the period 2013-2018. Whereas bird species protected under the Birds Directive are unlikely to be directly affected by the measures set out in the draft Strategy, there is potential for indirect effects due to impacts on their habitat and foraging resources. According to the European Environment

Pre-Consultation NIS

Agency's dashboard for Article 12 main pressures and threats¹⁷, within Ireland, agriculture has been identified as a high impact pressure for 10% of Annex I bird taxa, and a high impact threat for 18% of Annex I bird taxa (with the pressure and threat located inside Ireland only).

As with Annex I habitats and Annex II species, there are specific pressures and threats of relevance to the objectives of the draft Strategy. These threats and pressures, bird species for which the pressure or threat is listed are set out in **Table 5-3**. Pressure/threat data for bird species was taken from the European Environment Agency (EEA) repository on Article 12 reporting for Ireland¹⁸.

¹⁷ Available at: <https://www.eea.europa.eu/en/analysis/maps-and-charts/main-pressures-and-threats-article-12> [Accessed: 21/01/2026]

¹⁸ Available at: https://cdr.eionet.europa.eu/ie/eu/art12/envxztxxq/IE_birds_reports_20191031-130157.xml/manage_document [Accessed 21/01/2026].

Pre-Consultation NIS

Table 5-3: Relevant Pressure/Threat¹⁹ Data for Annex I Habitats and Annex II Species based on NPWS Article 17 Reporting (NPWS, 2025b; NPWS, 2025c) for 2019-2024 Period.

Code	Pressure/Threat	Description	Relevance to Assessment of Draft Policy Document	Annex I Habitats & Annex II Species for which Pressure/ Threat is Listed
<p>Habitats/species in red text indicate the threat/pressure has high influence, those in orange text indicate the threat/pressure has medium influence and those in blue text indicate the threat/pressure has low influence. Where the scope (proportion of species population or habitat affected by the threat/pressure) is classified as “majority 50-90%” or “whole >90%” as per NPWS Article 17 reporting, the relevant habitat or species is in <u>bold and underlined</u> text, otherwise, the scope is “minority <50%”.</p>				
PA11	Soil management practices in agriculture (e.g. ploughing)	<p>Inappropriate use of soil management practices in agriculture or techniques or timing of soil management and tillage (e.g. ploughing at inappropriate times, using inadequate machinery for ploughing or the inappropriate use of tillage (for instance in grasslands)).</p> <p>This pressure does not include fertilisation, which shall be reported in the separate pressure PA13 "Application of natural or synthetic fertilisers on agricultural land").</p>	<p>Biosolids produced are received by the agricultural sector and used as a fertiliser and soil conditioner in accordance with the European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2025 and the <i>Code of Good Practice for Use of Biosolids in Agriculture</i>. This pressure/threat is considered relevant to this assessment.</p>	None
PA13	Application of natural or synthetic fertilisers on agricultural land	<p>Use, application, treatment and stocking of natural (e.g. manure, slurry) and synthetic fertilisers for agricultural production. This also includes runoff, e.g. to wetlands, fresh water and marine environments, potentially impacting adjacent areas within the same catchment due to nutrient inputs (e.g. lakes, ponds and peatlands).</p>	<p>Biosolids produced are received by the agricultural sector and used as a fertiliser and soil conditioner in accordance with the European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2025 and the <i>Code of Good Practice for Use of Biosolids in Agriculture</i>. This pressure/threat is considered relevant to this assessment.</p>	<p>Timing: Ongoing and likely to be in the future</p> <p>6210 Orchid-rich calcareous grassland*</p> <p>6230 Species-rich <i>Nardus</i> grassland*</p> <p>6410 Molinia meadows</p> <p>6430 Hydrophilous tall-herb swamp</p> <p>2190 Dune Slacks</p> <p>6510 Hay meadows</p> <p>7140 Transition mires</p> <p>91A0 Old oak woodland</p> <p>1095 Sea Lamprey (<i>Petromyzon marinus</i>)</p> <p>1096 Brook Lamprey (<i>Lampetra planeri</i>)</p> <p>1099 River Lamprey (<i>Lampetra fluviatilis</i>)</p>

¹⁹ Threats and pressure categories and descriptions extracted from EEA reference portal for Article 17 Reporting. Available at: https://cdr.eionet.europa.eu/help/habitats_art17 [Accessed: 07/01/2026].

Pre-Consultation NIS

Code	Pressure/Threat	Description	Relevance to Assessment of Draft Policy Document	Annex I Habitats & Annex II Species for which Pressure/ Threat is Listed
				1103 Twaite Shad (<i>Alosa fallax</i>) 1355 Otter (<i>Lutra lutra</i>) Timing: Only in the future 5046 Killarney Shad (<i>Alosa fallax killarnensis</i>)
PA17	Agricultural activities generating pollution to surface or ground waters (including marine)	This pressure addresses diffuse and point source water pollution resulting from activities which cannot be directly attributed to specific activities covered by other level 2 pressures (e.g. point pollution from an animal farm that should be reported as PA20 "Livestock farming generating pollution", or diffuse pollution due to the application of fertilisers should be reported under respective activities PA13 "Application of natural or synthetic fertilisers on agricultural land"). This pressure further includes pollution from waste management practices in agriculture.	<p>Biosolids produced are received by the agricultural sector and used as a fertiliser and soil conditioner in accordance with the European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2025 and the <i>Code of Good Practice for Use of Biosolids in Agriculture</i>.</p> <p>Storage facilities are required for biosolids, particularly during periods when application of biosolids to land is not allowed as required by the Code of Good Practice for the use of Biosolids in Agriculture and GAP Regulations.</p> <p>This pressure/threat is considered relevant to this assessment.</p>	Timing: Ongoing or Ongoing and likely to be in the future 1130 Estuaries 1140 Tidal mudflats and sandflats 1150 Lagoons 1160 Large shallow inlets and bays 1310 <i>Salicornia</i> mud 1330 Atlantic salt meadows 3110 Oligotrophic isoetid lake habitat 3130 Slender Naiad-type lakes 3140 Hard-water lakes habitat 3150 Rich pondweed lake habitat 3160 Acid oligotrophic lake habitats 3180 Turloughs* 3260 Vegetation of flowing waters 7140 Transition mires 7210 <i>Cladium</i> fens* 7220 Petrifying springs* 7230 Alkaline fens 1833 Slender Naiad (<i>Najas flexilis</i>) 1106 Atlantic salmon (<i>Salmo salar</i>) 1029 Freshwater pearl mussel (<i>Margaritifera margaritifera</i>) 1095 Sea lamprey (<i>Petromyzon marinus</i>) 1096 Brook Lamprey (<i>Lampetra planeri</i>) 1099 River Lamprey (<i>Lampetra fluviatilis</i>)

Pre-Consultation NIS

Code	Pressure/Threat	Description	Relevance to Assessment of Draft Policy Document	Annex I Habitats & Annex II Species for which Pressure/ Threat is Listed
				1103 Twaite Shad (<i>Alosa fallax</i>) 1355 Otter (<i>Lutra lutra</i>)
PA18	Agricultural activities generating air pollution	This pressure addresses air pollution resulting from agricultural activities and agricultural land use which cannot be directly attributed to specific activities covered by other level 2 pressures (e.g. air pollution from an animal farm that should be reported as PA20 "Livestock farming generating pollution"). This pressure further includes pollution from waste management practices in agriculture.	<p>Biosolids produced are received by the agricultural sector and used as a fertiliser and soil conditioner in accordance with the European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2025 and the <i>Code of Good Practice for Use of Biosolids in Agriculture</i>.</p> <p>Storage facilities are required for biosolids, particularly during periods when application of biosolids to land is not allowed as required by the Code of Good Practice for the use of Biosolids in Agriculture and GAP Regulations.</p> <p>This pressure/threat is considered relevant to this assessment.</p>	<p>Timing: Ongoing and likely to be in the future</p> <p>4010 Wet heath</p> <p>4060 Alpine and subalpine heath</p> <p>7130 Blanket bog (*active)</p> <p>7150 Rhynchosporion depressions</p> <p>8210 Calcareous rocky slopes</p>
PA19	Agricultural activities generating soil pollution	This pressure should be used to address the pollution resulting from activities which cannot be directly attributed to specific activities covered by other level 2 pressures (e.g. diffuse pollution due to application of fertilisers or plant protection chemicals should be reported under respective activities PA13 "Application of natural or synthetic fertilisers on agricultural land" or PA14 "Use of plant protection chemicals in agriculture"). This pressure further includes pollution from waste management practices in agriculture.	<p>Biosolids produced are received by the agricultural sector and used as a fertiliser and soil conditioner in accordance with the European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2025 and the <i>Code of Good Practice for Use of Biosolids in Agriculture</i>.</p> <p>Storage facilities are required for biosolids, particularly during periods when application of biosolids to land is not allowed as required by the Code of Good Practice for the use of Biosolids in Agriculture and GAP Regulations.</p> <p>This pressure/threat is considered relevant to this assessment.</p>	<p>Timing: Ongoing or Ongoing and likely to be in the future</p> <p>2130 Fixed dunes (grey dunes)*</p> <p>2190 Dune slacks</p> <p>21A0 Machair*</p> <p>91A0 Old oak woodland</p>

Pre-Consultation NIS

Code	Pressure/Threat	Description	Relevance to Assessment of Draft Policy Document	Annex I Habitats & Annex II Species for which Pressure/ Threat is Listed
PB16	Application of natural or synthetic fertilisers in forestry	Use, application, treatment and stocking of synthetic and natural fertilisers (e.g. manure, slurry, liming) in forestry.	Landspreading on forestry has been identified as a potential alternative non-agricultural land use option for biosolids.	None
PB19	Forestry activities generating pollution to surface or ground waters (including marine)	This pressure addresses diffuse water pollution resulting from activities which cannot be directly attributed to specific activities covered by other level 2 pressures (e.g. diffuse pollution due to application of fertilisers or plant protection chemicals should be reported under respective activities PB16 "Application of natural or synthetic fertilisers in forestry" or PB17 "Use of plant protection chemicals in forestry").	Landspreading on forestry has been identified as a potential alternative non-agricultural land use option for biosolids.	Timing: Ongoing and likely to be in the future 3110 Oligotrophic isoetid lake habitat 3130 Slender Naiad-type lakes 3140 Hard-water lake habitat 3150 Rich pondweed lake habitat 3160 Acid oligotrophic lake habitat 3180 Turloughs* 3260 Vegetation of flowing waters 7210 <i>Cladium fens*</i> 7230 Alkaline fens 1833 Slender Naiad (<i>Najas flexilis</i>) 1029 Freshwater pearl mussel (<i>Margaritifera margaritifera</i>) 1355 Otter (<i>Lutra lutra</i>)
PB20	Forestry activities generating air pollution	This pressure addresses air pollution resulting from forestry activities.	Landspreading on forestry has been identified as a potential alternative non-agricultural land use option for biosolids.	None
PB21	Forestry activities generating soil pollution	This pressure addresses soil pollution resulting from activities which cannot be directly attributed to specific activities covered by other level 2 pressures (e.g. soil pollution due to application of fertilisers or plant protection chemicals should be reported under respective activities PB16 "Application of natural or synthetic fertilisers in forestry" or PB17 "Use of plant protection chemicals in forestry").	Landspreading on forestry has been identified as a potential alternative non-agricultural land use option for biosolids.	None
PD05	Development and operation of energy production plants (including infrastructure)	Development and operation of energy production plants (e.g. bioenergy plants, fossil and nuclear energy plants).	The draft Strategy includes for the provision of bioenergy infrastructure (e.g., anaerobic digestion facilities).	None

Pre-Consultation NIS

Code	Pressure/Threat	Description	Relevance to Assessment of Draft Policy Document	Annex I Habitats & Annex II Species for which Pressure/ Threat is Listed
PF01	Conversion from other land uses to built-up areas	<p>Conversion of natural and semi-natural habitats to housing, settlement or recreational areas (including development of dispersed housing) as well as to commercial or industrial areas (e.g. building the industrial parks or warehouse zones) or construction of solitary buildings not dedicated to housing and recreation (like solitary buildings for agricultural or forestry use).</p> <p>This pressure relates not only to land use changes that occurred during the reporting period, it also refers to instances where continuing the current land use of a natural/semi-natural habitat prevent the latter from being restored.</p>	This pressure/threat is considered relevant to this assessment due to the proposed provision of new infrastructure (e.g., storage facilities, Bioresource Centres) as part of the Strategy.	<p>Timing: Ongoing and likely to be in the future</p> <p>1220 Vegetated shingle</p> <p>1230 Vegetated sea cliffs</p> <p>4030 Dry heaths</p> <p>5130 Juniper scrub</p> <p>7220 Petrifying springs*</p> <p>8240 Limestone pavement*</p> <p>1303 Lesser Horseshoe Bat (<i>Rhinolophus hipposideros</i>)</p>
PF02	Construction or modification (e.g. of housing and settlements) in existing built-up areas	<p>Construction in existing urban or recreational areas, commercial or industrial areas, reconstruction of existing buildings and structures, as well as the demolition of (industrial) buildings, other industrial infrastructure and human structures. This pressure can include e.g. demolition of structures important for nesting or sheltering of birds and bats, negative impact of isolation or other reconstruction works to nesting birds or bats. Includes deliberate closure of roofs (to prevent bats or birds). It also includes reconstructions and demolition of solitary buildings, like solitary buildings for agricultural or forestry use.</p>	This pressure/threat is considered relevant to this assessment due to the proposed provision of new infrastructure or upgrade of infrastructure (e.g., existing Bioresource Centres) as part of the strategy.	<p>Timing: Ongoing and likely to be in the future</p> <p>7140 Transition mires</p> <p>21A0 Machair*</p> <p>1303 Lesser Horseshoe Bat (<i>Rhinolophus hipposideros</i>)</p>
PF06	Deposition and treatment of waste/rubbish from built-up areas.	<p>Management, including deposition and treatment (e.g. dumps, landfills, incineration and other methods of physical or biological processing) of waste from urban and recreational areas (e.g. household waste, other urban waste like waste from hospitals or from urban</p>	This pressure/threat is considered relevant to this assessment. The draft Strategy includes measures related to the treatment of sludge generated from wastewater treatment plants which may receive inputs (some of which may	<p>Timing: Ongoing, Ongoing/future or Ongoing and likely to be in the future</p> <p>1220 Vegetated shingle</p> <p>1330 Atlantic salt meadows</p> <p>1410 Mediterranean salt meadows</p>

Pre-Consultation NIS

Code	Pressure/Threat	Description	Relevance to Assessment of Draft Policy Document	Annex I Habitats & Annex II Species for which Pressure/ Threat is Listed
		green areas, food waste from recreational areas) as well as from industrial production processes.	require a licence) from commercial and industrial facilities.	2120 Marram dunes (white dunes) 2130 Fixed dunes (grey dunes)* 21A0 Machair* 7140 Transition mires 7220 Petrifying springs* 7230 Alkaline fens 91A0 Old oak woodland 91E0 Alluvial woodland*
PF09	Residential, commercial and industrial activities and structures generating air pollution	Different activities related to residential and commercial areas as well as to industrial activities generating air pollution (e.g. heating or industrial production). This also include recreational activities.	The draft Strategy includes for the provision of infrastructure to treat sludge, which may generate air pollution.	None
PE01	Roads, paths, railroads and related infrastructure	Construction and operation (e.g. collisions, traffic, noise, light, fencing associated with roads, use of salt for snow cleaning etc.) of road and related infrastructure (e.g. bridges, viaducts, tunnels) and related pressures such as animal mortality, habitat fragmentation, improved access to sites via roads and paths.	The draft Strategy includes a sludge transport strategy.	Timing: Ongoing or Ongoing and likely to be in the future 1220 Vegetated shingle 1230 Vegetated sea cliffs 1330 Atlantic salt meadows 2130 Fixed dunes (grey dunes)* 21A0 Machair* 3270 Chenopodium rubric 4010 Wet heaths 4030 Dry heaths 4060 Alpine and subalpine heath 5130 Juniper scrub 6210 Orchid-rich calcareous grassland* 6410 Molinia meadows 7120 Degraded raised bogs 7130 Blanket bog (active)* 7140 Transition mires 7150 Rhynchosporion depressions

Pre-Consultation NIS

Code	Pressure/Threat	Description	Relevance to Assessment of Draft Policy Document	Annex I Habitats & Annex II Species for which Pressure/ Threat is Listed
				7230 Alkaline fens 8120 Calcareous scree 1303 Lesser Horseshoe Bat (<i>Rhinolophus hipposideros</i>) 1355 Otter (<i>Lutra lutra</i>)
PK01	Mixed Source Pollution to Surface and Ground Waters (Limnic and Terrestrial)	Pollution should only be reported under this category when the key driver of the pollution is unclear or where pollution is related to several causes (e.g. river eutrophication can be related to several direct and indirect sources like sewage, agricultural and industrial discharges, diffuse pollution from agriculture, decreased retention of alluvial vegetation due to inadequate management). Where a key sectoral driver can be identified, pollution should be reported under the corresponding sectoral pollution category.	Biosolids produced are received by the agricultural sector and used as a fertiliser and soil conditioner in accordance with the European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2025 and the <i>Code of Good Practice for Use of Biosolids in Agriculture</i> . This pressure/threat is considered relevant to this assessment.	Timing: Ongoing and likely to be in the future 7220 Petrifying springs* 1095 Sea Lamprey (<i>Petromyzon marinus</i>) 1096 Brook Lamprey (<i>Lampetra planeri</i>) 1099 River Lamprey (<i>Lampetra fluviatilis</i>) 1103 Twaite Shad (<i>Alosa fallax</i>) 6284 Natterjack Toad (<i>Epidalea calamita</i>) 1106 Atlantic salmon (<i>Salmo salar</i>) Timing: Only in the Future 6985 Killarney Fern (<i>Vandenboschia speciosa</i>) 5046 Killarney Shad (<i>Alosa fallax killarnensis</i>)
PK02	Mixed Source Marine Water Pollution (Marine and Coastal)	Pollution should only be reported under this category when the key driver of the pollution is unclear or where pollution is related to several causes (e.g. marine pollution by hydrocarbons can be related to several sources, like industrial discharges, water and land based transport operation, pollution, transport and exploitation accidents). Where a key sectoral driver can be identified, pollution should be reported under the corresponding sectoral pollution category.	Biosolids produced are received by the agricultural sector and used as a fertiliser and soil conditioner in accordance with the European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2025 and the <i>Code of Good Practice for Use of Biosolids in Agriculture</i> . This pressure/threat is considered relevant to this assessment.	Timing: Ongoing or Ongoing and likely to be in the future 1150 Lagoons* 1310 Salicornia mud 1420 Halophilous scrub
PK03	Mixed source air pollution, air-borne pollutants	Pollution should only be reported under this category when the key driver of the pollution is unclear or where pollution is related to several causes (e.g. source of pollutants for acid rain is usually a mix of	Biosolids produced are received by the agricultural sector and used as a fertiliser and soil conditioner in accordance with the European Union (Good Agricultural Practice for the Protection of Waters)	Timing: Ongoing and likely to be in the future 4010 Wet heaths 4030 Dry heaths 7130 Blanket bog (active)*

Pre-Consultation NIS

Code	Pressure/Threat	Description	Relevance to Assessment of Draft Policy Document	Annex I Habitats & Annex II Species for which Pressure/ Threat is Listed
		emissions from vehicles, power plants etc.). Where a key sectoral driver can be identified, pollution should be reported under the corresponding sectoral pollution category.	Regulations 2025 and the <i>Code of Good Practice for Use of Biosolids in Agriculture</i> . This pressure/threat is considered relevant to this assessment.	7150 Rhynchosporion depressions 8110 Siliceous scree 8120 Calcareous scree 8210 Calcareous rocky slopes 8220 Siliceous rocky slopes
PK04	Atmospheric N-deposition	This pressure is to be used when atmospheric nitrogen deposition is identified as the key contributing pressure but the source of which is either mixed or from too many sources to identify a main source. Nitrogen compounds can be either gaseous form or dry deposition (particulate matter) or precipitation (wet deposition). Sources can be natural (e.g. volcanic, oceanic, biological decay), biogenic (e.g., agricultural fertilisers) or industrial (e.g., fuel combustion, coal and power plants, settlements) and can be either point or diffuse sources. Where the main source can be identified, this should be reported under the relevant sector and not under mixed source pollution.	Biosolids produced are received by the agricultural sector and used as a fertiliser and soil conditioner in accordance with the European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2025 and the <i>Code of Good Practice for Use of Biosolids in Agriculture</i> . This pressure/threat is considered relevant to this assessment.	Timing: Ongoing and likely to be in the future 7110 Raised bog (active)* 7120 Degraded raised bogs
PK05	Mixed source soil pollution and solid waste (excluding discharges)	Pollution should only be reported under this category when the key driver of the pollution is unclear or where pollution is related to several causes (excluding discharges). Where a key sectoral driver can be identified, pollution should be reported under the corresponding sectoral pollution category.	Biosolids produced are received by the agricultural sector and used as a fertiliser and soil conditioner in accordance with the European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2025 and the <i>Code of Good Practice for Use of Biosolids in Agriculture</i> . This pressure/threat is considered relevant to this assessment.	Timing: Ongoing and likely to be in the future 1220 Vegetated shingle 1330 Atlantic salt meadows 2110 Embryonic shifting dunes 2120 Marram dunes (white dunes) 6210 Orchid-rich calcareous grassland*

*priority habitat

Pre-Consultation NIS

Table 5-4: Relevant Pressure/Threat²⁰ Data for Bird Species Listed in Article 12 Reporting for 2013-2018²¹ Period. Pressure/threat Data for Bird Species taken from EEA Repository on Article 12 Reporting.

Code	Pressure/Threat	Description	Relevance to Assessment of Draft Policy Document	Bird Species Listed in Article 12 Reporting. Species in bold are listed as SCI for SPAs.
Species in red text indicate the threat/pressure is of high importance, whereas those in orange text indicate the threat/pressure is of medium importance. Where the ranking differs between the threat and pressure, this is recorded as a footnote. Species in bold text are Special Conservation Interest (SCI) species.				
A15	Tillage practices (e.g. ploughing) in agriculture	Inappropriate techniques or timing of tillage, for example, ploughing at inappropriate times, using inadequate machinery for ploughing or the inappropriate use of tillage (e.g. tillage in grasslands).	Biosolids produced are received by the agricultural sector and used as a fertiliser and soil conditioner in accordance with the European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2025 and the <i>Code of Good Practice for Use of Biosolids in Agriculture</i> . This pressure/threat is considered relevant to this assessment.	A082 Hen harrier (<i>Circus cyaneus</i>)
A16	Other soil management practices in agriculture	Inappropriate use of soil management practices in agriculture or inappropriate techniques/timing of soil management other than tillage.	Biosolids produced are received by the agricultural sector and used as a fertiliser and soil conditioner in accordance with the European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2025 and the <i>Code of Good Practice for Use of Biosolids in Agriculture</i> . This pressure/threat is considered relevant to this assessment.	None
A19	Application of natural fertilisers on agricultural land	Use, application, treatment and stocking of natural fertilisers (e.g. manure, slurry) for agricultural production.	Biosolids produced are received by the agricultural sector and used as a fertiliser and soil conditioner in accordance with the European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2025 and the <i>Code of Good Practice for Use</i>	A275 Whinchat (<i>Saxicola rubetra</i>)[‡]

²⁰ Threats and pressure categories and descriptions extracted from EEA reference portal for Article 12 Reporting. Available at: https://cdr.eionet.europa.eu/help/birds_art12/2013-2018 [Accessed: 07/01/2026].

²¹ Data for reporting cycle 2019-2024 not available at time of writing.

Pre-Consultation NIS

Code	Pressure/Threat	Description	Relevance to Assessment of Draft Policy Document	Bird Species Listed in Article 12 Reporting. Species in bold are listed as SCI for SPAs.
			<i>of Biosolids in Agriculture</i> . This pressure/threat is considered relevant to this assessment.	
A24	Waste management practices in agriculture	Management of waste in agriculture (e.g. temporary holding of solutions like manure storage ponds/lagoons or deposition of waste).	Storage facilities are required for biosolids, particularly during periods when application of biosolids to land is not allowed as required by the Code of Good Practice for the use of Biosolids in Agriculture and GAP Regulations.	None
A26	Agricultural activities generating diffuse pollution to surface or ground waters	This pressure addresses diffuse water pollution resulting from activities which cannot be directly attributed to specific activities covered by other level 2 pressures.	Biosolids produced are received by the agricultural sector and used as a fertiliser and soil conditioner in accordance with the European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2025 and the <i>Code of Good Practice for Use of Biosolids in Agriculture</i> . This pressure/threat is considered relevant to this assessment.	A297 Reed warbler (<i>Acrocephalus scirpaceus</i>) [‡] A065 Common Scoter (<i>Melanitta nigra</i>) [‡] A229 Kingfisher (<i>Alcedo atthis</i>) A075 White-tailed eagle (<i>Haliaeetus albicilla</i>) [§]
A27	Agricultural activities generating air pollution	This pressure addresses air pollution resulting from agricultural activities and agricultural land use.	Biosolids produced are received by the agricultural sector and used as a fertiliser and soil conditioner in accordance with the European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2025 and the <i>Code of Good Practice for Use of Biosolids in Agriculture</i> . This pressure/threat is considered relevant to this assessment.	None
A28	Agricultural activities generating marine pollution	This pressure addresses point or diffuse source marine pollution resulting from activities which cannot be directly attributed to specific activities covered by other level 2 pressures.	Biosolids produced are received by the agricultural sector and used as a fertiliser and soil conditioner in accordance with the European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2025 and the <i>Code of Good Practice for Use of Biosolids in Agriculture</i> . This	None

Pre-Consultation NIS

Code	Pressure/Threat	Description	Relevance to Assessment of Draft Policy Document	Bird Species Listed in Article 12 Reporting. Species in bold are listed as SCI for SPAs.
			pressure/threat is considered relevant to this assessment.	
A29	Agricultural activities generating soil pollution	This pressure should be used to address the pollution resulting from activities which cannot be directly attributed to specific activities covered by other level 2 pressures.	Biosolids produced are received by the agricultural sector and used as a fertiliser and soil conditioner in accordance with the European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2025 and the <i>Code of Good Practice for Use of Biosolids in Agriculture</i> . This pressure/threat is considered relevant to this assessment.	None
B18	Application of natural fertilisers	Use, application, treatment and stocking of natural fertilisers (e.g. manure, slurry) in forestry.	Landspreading on forestry has been identified as a potential alternative non-agricultural land use option for biosolids.	None
B23	Forestry activities generating pollution to surface or ground waters	This pressure addresses diffuse water pollution resulting from activities which cannot be directly attributed to specific activities covered by other level 2 pressures.	Landspreading on forestry has been identified as a potential alternative non-agricultural land use option for biosolids.	A229 Kingfisher (<i>Alcedo atthis</i>)
B24	Forestry activities generating air pollution	This pressure addresses air pollution resulting from forestry activities.	Landspreading on forestry has been identified as a potential alternative non-agricultural land use option for biosolids.	None
B25	Forestry activities generating marine pollution	This pressure addresses marine pollution resulting from activities which cannot be directly attributed to specific activities covered by other level 2 pressures.	Landspreading on forestry has been identified as a potential alternative non-agricultural land use option for biosolids.	None
B26	Forestry activities generating soil pollution	This pressure addresses soil pollution resulting from activities which cannot be directly attributed to specific activities covered by other level 2 pressures.	Landspreading on forestry has been identified as a potential alternative non-agricultural land use option for biosolids.	None
D05	Development and operation of energy production plants (including bioenergy plants, fossil and nuclear energy plants)	Development and operation of energy production plants (e.g. bioenergy plants, fossil and nuclear energy plants).	The draft Strategy includes for the provision of bioenergy infrastructure (e.g., anaerobic digestion facilities).	None

Pre-Consultation NIS

Code	Pressure/Threat	Description	Relevance to Assessment of Draft Policy Document	Bird Species Listed in Article 12 Reporting. Species in bold are listed as SCI for SPAs.
E01	Roads, paths, railroads and related infrastructure (e.g. bridges, viaducts, tunnels)	Construction and operation (e.g. collisions, traffic, noise, light, fencing associated with roads, use of salt for snow cleaning etc.) of road and related infrastructure and related pressures such as animal mortality, habitat fragmentation, improved access to sites via roads and paths.	The draft Strategy includes a sludge transport strategy.	A395 Greenland White-fronted Goose (<i>Anser albifrons flavirostris</i>) ‡ A074 Red Kite (<i>Milvus milvus</i>)‡ A213 Barn Owl (<i>Tyto alba</i>) A221 Long-eared Owl (<i>Asio otus</i>)
F03	Conversion from other land uses to commercial / industrial areas (excluding drainage and modification of coastline, estuary and coastal conditions)	Conversion of natural and semi-natural habitats to commercial or industrial areas (e.g. building the industrial parks or warehouse zones) or construction of solitary buildings not dedicated to housing and recreation (like solitary buildings for agricultural or forestry use).	This pressure/threat is considered relevant to this assessment due to the proposed provision of new infrastructure (e.g., storage facilities, Bioresource Centres) as part of the Strategy.	None
F04	Construction or modification of commercial / industrial infrastructure in existing commercial / industrial areas	Construction in existing commercial or industrial areas, reconstruction of existing buildings and other industrial infrastructure and demolition of buildings and industrial structures. Includes reconstructions and demolishment of solitary buildings not dedicated for housing and recreation (like solitary buildings for agricultural or forestry use).	This pressure/threat is considered relevant to this assessment due to the proposed upgrade of infrastructure (e.g., existing Bioresource Centres) as part of the strategy.	None
F10	Deposition and treatment of waste/garbage from commercial and industrial facilities.	Management, including deposition and treatment (e.g. dumps, landfills, incineration recycling and other methods of physical or chemical processing) of waste from industrial production processes.	This pressure/threat is considered relevant to this assessment. The draft Strategy includes measures related to the treatment of sludge generated from wastewater treatment plants which may receive inputs (some of which may require a licence) from commercial and industrial facilities.	None
F19	Industrial and commercial activities and structures generating air pollution	Industrial activities (i.e. industrial production and processing) generating air pollution (e.g. industrial production).	The draft Strategy includes for the provision of infrastructure to treat sludge, which may generate air pollution.	None

Pre-Consultation NIS

Code	Pressure/Threat	Description	Relevance to Assessment of Draft Policy Document	Bird Species Listed in Article 12 Reporting. Species in bold are listed as SCI for SPAs.
J01	Mixed Source Pollution to Surface and Ground Waters (Limnic and Terrestrial)	Mixed source pollution to surface and ground waters. Pollution should only be reported under this category when the key driver of the pollution is unclear or where pollution is related to several causes. (e.g. river eutrophication can be related to several direct and indirect sources like sewage, agricultural and industrial discharges, diffuse pollution from agriculture, decreased retention of alluvial vegetation due to inadequate management). Where a key sectoral driver can be identified, pollution should be reported under the corresponding sectoral pollution category.	Biosolids produced are received by the agricultural sector and used as a fertiliser and soil conditioner in accordance with the European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2025 and the <i>Code of Good Practice for Use of Biosolids in Agriculture</i> . This pressure/threat is considered relevant to this assessment.	A059 Pochard (<i>Aythya ferina</i>)** A061 Tufted duck (<i>Aythya fuligula</i>)** A062 Scaup (<i>Aythya marila</i>)** A067 Goldeneye (<i>Bucephala clangula</i>)** A125 Coot (<i>Fulica atra</i>) A889 Gadwall (<i>Mareca strepera</i>) A229 Kingfisher (<i>Alcedo atthis</i>)
J02	Mixed Source Marine Water Pollution (Marine and Coastal)	Mixed source marine water pollution (marine and coastal). Pollution should only be reported under this category when the key driver of the pollution is unclear or where pollution is related to several causes (e.g. marine pollution by hydrocarbons can be related to several sources, like industrial discharges, water and land based transport operation, pollution, transport and exploitation accidents). Where a key sectoral driver can be identified, pollution should be reported under the corresponding sectoral pollution category.	Biosolids produced are received by the agricultural sector and used as a fertiliser and soil conditioner in accordance with the European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2025 and the <i>Code of Good Practice for Use of Biosolids in Agriculture</i> . This pressure/threat is considered relevant to this assessment.	A395 Greenland white-fronted goose (<i>Anser albifrons flavirostris</i>)‡ A016 Gannet (<i>Morus bassanus</i>)‡ A018 Shag (<i>Phalacrocorax aristotelis</i>)‡ A175 Great Skua (<i>Catharacta skua</i>)‡ A193 Common tern (<i>Sterna hirundo</i>)‡ A199 Guillemot (<i>Uria aalga</i>)‡ A200 Razorbill (<i>Alca torda</i>)‡
J03	Mixed source air pollution, air-borne pollutants	Mixed source air pollution, air-borne pollutants. Pollution should only be reported under this category when the key driver of the pollution is unclear or where pollution is related to several causes (e.g. source of pollutants for acid rain is usually a mix of emissions from vehicles, power plants etc.). Where a key sectoral driver can be identified, pollution	Biosolids produced are received by the agricultural sector and used as a fertiliser and soil conditioner in accordance with the European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2025 and the <i>Code of Good Practice for Use of Biosolids in Agriculture</i> . This	None

Pre-Consultation NIS

Code	Pressure/Threat	Description	Relevance to Assessment of Draft Policy Document	Bird Species Listed in Article 12 Reporting. Species in bold are listed as SCI for SPAs.
		should be reported under the corresponding sectoral pollution category.	pressure/threat is considered relevant to this assessment.	
J04	Mixed source soil pollution and solid waste (excluding discharges)	Mixed source soil pollution and solid waste (excluding discharges). Pollution should only be reported under this category when the key driver of the pollution is unclear or where pollution is related to several causes. Where a key sectoral driver can be identified, pollution should be reported under the corresponding sectoral pollution category.	Biosolids produced are received by the agricultural sector and used as a fertiliser and soil conditioner in accordance with the European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2025 and the <i>Code of Good Practice for Use of Biosolids in Agriculture</i> . This pressure/threat is considered relevant to this assessment.	None

‡ listed as a threat only

§ listed as a pressure only

** pressure has high importance, threat has medium importance

5.3.8 Water Dependent Habitats and Species

Water dependent habitats and species in Ireland are likely to be a key receptor in relation to the landspreading of biosolids (e.g., as a result of potential losses of nutrients or contaminants to waterbodies). A guidance document titled “Water Framework Directive Annex IV Protected Areas: Water Dependent Habitats and Species and High Status Sites”, prepared by Mayes (2008) and published by the Department of the Environment, Heritage and Local Government provides detail on the majority of water dependent habitats and species listed under the Habitats Directive in Ireland. The document was prepared in consultation with the NPWS and EPA. A list of water dependent habitats and species was also provided to RPS by the NPWS as part of an information request. The list provided by the NPWS outlines forty-eight different water-dependent Annex I habitat types and 22 water-dependent Annex II species. These habitats and species are listed in **Table 5-5** and **Table 5-6** below. The overall status and trend of each water dependent habitat and species is also provided based on the most recent Article 17 reporting (NPWS, 2025a). A list of bird species considered to be water dependent (at least in part) was also provided to RPS by the NPWS. This list is derived from the definition and list used in Lewis et al. (2019) and includes both breeding and wintering species, as well as species which are not currently listed as special conservation interests within an SPA in Ireland. A total of 100 different species are listed.

Table 5-5: Water Dependent Annex I Habitats

EU Code	EU Annex I Habitats (Natura 2000 code) (* = priority type)	Water Dependency	Overall Status	Trend
Water dependency indicates whether the habitat receives water from or is otherwise supported by surface water (SW), marine water (MW) or groundwater (GW). The list of habitats and their water dependency has been updated with data from the NPWS where required. Overall status and trend is based on the most recent (2025a) NPWS Article 17 data.				
MARINE AND COASTAL HABITATS				
1110	Sandbanks which are slightly covered by sea water all the time	MW	Favourable	Stable
1130	Estuaries	SW, MW	Bad	Stable
1140	Mudflats and sandflats not covered by sea water at low tide	MW	Inadequate	Stable
1150	*Coastal lagoons	SW, GW, MW	Bad	Deteriorating
1160	Large shallow inlets and bays	SW, MW	Bad	Deteriorating
1170	Reefs	MW	Bad	Stable
1180 [§]	Submarine structures made by leaking gases	MW	Favourable	Stable
8330	Submerged or partially submerged sea caves	MW	Favourable	Stable
COASTAL HABITATS WITH TERRESTRIAL VEGETATION				
1210	Annual vegetation of drift lines	MW	Inadequate	Stable
1220	Perennial vegetation of stony banks	MW	Inadequate	Deteriorating
1230	Vegetated sea cliffs of the Atlantic and Baltic coasts	MW	Inadequate	Stable
1310	<i>Salicornia</i> and other annuals colonising mud and sand	MW	Bad	Deteriorating
1330	Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>)	GW, MW	Bad	Deteriorating
1410	Mediterranean salt meadows (<i>Juncetalia maritimi</i>)	GW, MW	Inadequate	Deteriorating
1420	Mediterranean and thermo-Atlantic halophilous scrubs (<i>Sarcocornetea fruticosi</i>)	MW	Bad	Stable
2110	Embryonic shifting dunes	MW	Inadequate	Deteriorating
2120	Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (“white dunes”)	MW	Inadequate	Deteriorating

Pre-Consultation NIS

EU Code	EU Annex I Habitats (Natura 2000 code) (* = priority type)	Water Dependency	Overall Status	Trend
2130	*Fixed coastal dunes with herbaceous vegetation ("grey dunes")	MW	Bad	Deteriorating
2140	*Decalcified fixed dunes with <i>Empetrum nigrum</i>	MW	Favourable	Stable
2150	*Atlantic decalcified fixed dunes (<i>Calluno-Ulicetea</i>)	MW	Inadequate	Deteriorating
2170	Dunes with <i>Salix repens ssp. argentea</i> (<i>Salicion arenariae</i>)	MW, GW	Inadequate	Deteriorating
2190	Humid dune slacks	GW, MW	Inadequate	Deteriorating
21A0	Machairs (*in Ireland)	SW, GW, MW	Inadequate	Stable
FRESHWATER LAKES, TURLOUGHES				
3110	Oligotrophic waters containing very few minerals of sandy plains (<i>Littorelletalia uniflorae</i>)	SW, GW	Inadequate	Unknown
3130	Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletea uniflorae</i> and/or of the <i>Isoëto-Nanojuncetea</i>	SW, GW	Bad	Deteriorating
3140	Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara</i> spp.	SW, GW	Bad	Stable
3150	Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation	SW, GW	Inadequate	Unknown
3160	Natural dystrophic lakes and ponds	SW, GW	Inadequate	Increasing
3180	*Turloughs	SW, GW	Inadequate	Stable
FRESHWATER WATERCOURSES				
3260	Watercourses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation	SW, GW	Inadequate	Deteriorating
3270	Rivers with muddy banks with <i>Chenopodium rubri</i> p.p. and <i>Bidention</i> p.p. vegetation	GW	Inadequate	Deteriorating
SPRINGS AND FENS				
7220	*Petrifying springs with tufa formation (Cratoneurion)	GW	Inadequate	Stable
7210	*Calcareous fens with <i>Cladium mariscus</i> and species of the <i>Caricion davallianae</i>	GW	Bad	Deteriorating
7230	Alkaline fens	GW	Bad	Deteriorating
HEATH AND BOG				
4010	Northern Atlantic wet heaths with <i>Erica tetralix</i> (FLUSHES ONLY)	GW	Bad	Deteriorating
7110	*Active raised bogs (LAGG AND SUPPORT FUNCTION)	SW, GW	Bad	Increasing
7120	Degraded raised bogs still capable of natural regeneration (LAGG ONLY)	SW, GW	Bad	Increasing
7130	Blanket bog (*if active bog) (FLUSHES ONLY)	GW	Bad	Deteriorating
7140	Transition mires and quaking bogs	SW, GW	Bad	Deteriorating
7150	Depressions on peat substrates of the Rhynchosporion (WET HEATH ONLY)	SW, GW	Inadequate	Deteriorating
91D0	*Bog woodland	GW	Bad	Deteriorating
SWAMPS				
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	SW, GW	Bad	Deteriorating

Pre-Consultation NIS

EU Code	EU Annex I Habitats (Natura 2000 code) (* = priority type)	Water Dependency	Overall Status	Trend
GRASSLAND AND MARSH				
6410	<i>Molinia</i> meadows on calcareous, peaty or clayey-silt-laden soils (<i>Molinion caeruleae</i>)	GW	Bad	Deteriorating
6130 [§]	Calaminarian grasslands of the <i>Violetalia calaminariae</i>	GW	Inadequate	Deteriorating
6230 [§]	Species rich <i>Nardus</i> grasslands on silicious substrates in mountain areas*	GW	Bad	Deteriorating
6510 [§]	Lowland hay meadows (wet sub-type only)	GW	Bad	Increasing
WOODLAND AND SCRUB				
91E0	*Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-padion, Alnion incanae, Salicion albae)	SW, GW	Bad	Deteriorating
EXPOSED ROCK/DISTURBED GROUND				
8310	Caves not open to the public	GW	Favourable	Increasing

*priority habitat

§new additions to original Mayes (2008) list, based on data provided by the NPWS on HD/WFD water dependent habitats.

Table 5-6: Water Dependent Annex II Species

HD Species Code	Species Name	Common Name	Overall Status	Trend	Water Dependency
Water dependency indicates whether the species is supported by surface water (SW), marine water (MW) or groundwater (GW). Overall status and trend based on Article 17 Reporting (NPWS, 2025a). The list of species and their water dependency has been updated with data from the NPWS where required. Table extracted from Mayes (2008).					
1013	<i>Vertigo geyeri</i>	Geyer's whorl snail	Bad	Deteriorating	GW
1014	<i>Vertigo angustior</i>	Narrow-mouthed whorl snail	Bad	Deteriorating	GW
1016	<i>Vertigo moulinsiana</i>	Desmoulin's whorl snail	Inadequate	Deteriorating	SW, GW
1029	<i>Margaritifera margaritifera</i>	Freshwater pearl mussel	Bad	Deteriorating	SW
1065	<i>Euphydryas aurinia</i>	Marsh fritillary	Favourable	Improving	GW
1092	<i>Austropotamobius pallipes</i>	White-clawed crayfish	Bad	Deteriorating	SW, GW
1095	<i>Petromyzon marinus</i>	Sea lamprey	Bad	Deteriorating	SW, MW
1096	<i>Lampetra planeri</i>	Brook lamprey	Favourable	Stable	SW
1099	<i>Lampetra fluviatilis</i>	River lamprey	Inadequate	Unknown	SW
1103	<i>Alosa fallax</i>	Twaite shad	Bad	Deteriorating	SW, MW
5046	<i>Alosa killarneyensis</i>	Killarney shad	Favourable	Stable	SW
1106	<i>Salmo salar</i>	Atlantic salmon	Bad	Deteriorating	SW, MW
1349	<i>Tursiops truncatus</i>	Bottle-nosed dolphin	Favourable	Stable	MW
1351	<i>Phocoena phocoena</i>	Harbour porpoise	Inadequate	Stable	MW
1355	<i>Lutra lutra</i>	Otter	Favourable	Stable	SW, MW
1364	<i>Halichoerus grypus</i>	Grey seal	Favourable	Improving	MW
1365	<i>Phoca vitulina</i>	Common seal	Favourable	Stable	MW

Pre-Consultation NIS

HD Species Code	Species Name	Common Name	Overall Status	Trend	Water Dependency
6216	<i>Hamatocaulis vernicosus</i>	Slender Green Feather-Moss	Favourable	Stable	GW
1395	<i>Petalophyllum ralfsii</i>	Petalwort	Favourable	Stable	GW
6985	<i>Vandenboschia speciosa</i>	Killarney fern	Favourable	Stable	SW
1528	<i>Saxifraga hirculus</i>	Yellow marsh saxifrage	Favourable	Stable	GW
1833	<i>Najas flexilis</i>	Slender naiad	Bad	Deteriorating	SW

5.4 Potential Ecological Impacts and Effects of the Bioresources Management Process

Notwithstanding the extensive controls and regulations regarding the bioresources management process, there is potential for ecological impacts and effects to arise from that process, as described in the following sections, relevant to this assessment. There is also ongoing research regarding the certainty and significance of these potential impacts and effects. Furthermore, both the EPA and Sludges, Biosolids and other Organic Fertilisers Working Group²² have highlighted the need for current legislation and guidelines to be updated (see below) to address potential environmental concerns.

The focus of this section is on the key technical strategies associated with the management process (i.e., (1) treatment infrastructure and processes, (2) transport and (3) reuse/recycling of biosolids) through which European sites may potentially be at risk. These potential risks are discussed below. The potential adverse effects of each stage in the process on the integrity of European sites is then assessed in **Section 6 Appropriate Assessment**. The potential adverse effects of actions within the draft Strategy on the integrity of European sites is also assessed in **Section 6 Appropriate Assessment**.

5.4.1 Treatment & Transport

The effects that could arise as a result of treatment infrastructure and processes typically relate to direct or indirect effects associated with the provision of new infrastructure/treatment technologies (e.g., loss or disturbance of habitat or species). Such effects would typically be project specific and therefore would be subject to planning controls and procedures; including where required Appropriate Assessment under Article 6(3) of the EU Habitats Directive. In terms of transport, the effects that could arise typically relate to impacts associated with transporting sludge from WWTPs to designated satellites or hubs, and transport of treated sludge to outlets for reuse. Transport activities could result in direct or indirect effects on habitats and species as a result of air quality deterioration, or accidental pollutant release due to road traffic incidents or spills. However, the existing controls in place (set out in **Section 5.2.2**) would go some way towards mitigating potential impacts and effects. Such effects are associated with the day-to-day activities associated with the management process and are unlikely to be project specific.

5.4.2 Reuse/Recycling of Biosolids

In terms of the reuse of biosolids, the key potential effects that could arise are from losses of nutrients, heavy metals, or other contaminants to the environment. As noted previously, 100% of treated wastewater sludge from UÉ WWTPs is reused on agricultural land in Ireland as a fertiliser and soil conditioner. Potential effects arising from this stage in the process are widespread geographically and are not project specific. The main pollutants associated with biosolids that could migrate to the wider environment following landspreading are discussed below. It is worth noting, however, that UÉ has been auditing the landspreading of biosolids for

²² established under the National Technical Implementation Group (NTIG), which is part of the River Basin Management Planning and Water Framework Directive governance structures.

Pre-Consultation NIS

over 20 years, and no evidence has been brought forward by UÉ suggesting that landspreading biosolids is an issue in an Irish context.

The landspreading of wastewater sludge is regulated in Ireland through the NAP and implementing European Union (Good Agricultural Practice for the Protection of Waters) Regulations, 2025, the SSD and implementing Waste Management (Use of Sewage Sludge in Agriculture) Regulations, 1998 as amended, as well as the Codes of Good Practice for Use of Biosolids in Agriculture.

It should be noted that the most recent *Ireland's State of the Environment Report* (EPA, 2024a) notes that the requirements of the SSD no longer match current needs in the context of current and emerging contaminants of concern. According to the report:

“there is potential for these contaminants to enter the food chain, affecting human and animal health and also soil health and water quality. With multiple applications over many years, a build-up of contaminants may occur as well as changes in soil microbial communities, the latter of which may contribute to the evolution of AMR [antimicrobial resistance] in the environment, thereby posing a further risk. Effective management and treatment practices and robust regulation are therefore essential to minimise risks to animal and human health.”

Furthermore, the Sludges, Biosolids and other Organic Fertilisers Working Group has also flagged issues with the existing Codes of Practice for the Use of Biosolids in Agriculture, stating in their April 2025 report (Anon, 2025):

“The two Codes of Practice for the Use of Biosolids in Agriculture were developed in 2008 and urgently need to be updated to reflect current knowledge, practices and developments with a greater focus on water quality.”

Updating the Codes of Practice for the Use of Biosolids in Agriculture is a key recommendation in the Sludges, Biosolids and other Organic Fertilisers Working Group report, and according to the report it has been agreed that the Department of Climate, Energy and the Environment (DECC) would lead out on this recommendation, and a sub-group has been established to progress this work. UÉ are engaging with regulators and stakeholders in the revision of the Code of Good Practice for the Use of Biosolids in Agriculture.

Measures currently employed to mitigate potential ecological impacts of the bioresources management processes, including landspreading, are set out in **Section 5.2**. Furthermore, the draft Strategy also includes several measures which, if implemented, will work towards addressing the aforementioned concerns. These include, for example, increasing understanding of alternative outlets, carrying out a demonstration of Advanced Thermal Conversion (ATC) technology, implementation of a National Biosolids Assurance Scheme, implementation of a national emerging contaminants monitoring programme and carrying out additional analysis as needs emerge, ensuring all new regulatory requirements of the rUWWTD are met, engagement with regulators and stakeholders regarding the development of a revised Code of Good Practice for the Use of Biosolids in Agriculture, engagement with key stakeholders and consultation on PFAS limits, promotion of source control management and carrying out risk assessments for industrial / pharmaceutical effluent discharging into UÉ wastewater treatment plants.

5.4.2.1 Nutrient Losses

Water

Although biosolids derived from sludge contain valuable nutrients and organic matter components, these components can have negative effects on the receiving environment and species if inappropriately managed or spread. UÉ are required to comply with the obligations under the Sludge Regulations, as far as it is under their control, to ensure that the sludge is not inappropriately managed or spread.

The Catchment Science and Management Unit of the EPA recently published a report regarding the impacts of agricultural pressures on water quality in Ireland (EPA, 2024b). Agriculture is the most common land use in Ireland, covering approximately 70% of the country, the majority of which is in pasture. Agriculture has also been identified as the most prevalent significant pressure, impacting over 1000 waterbodies or approximately 60% of all waterbodies 'At Risk' of not achieving their environmental objective under the Water Framework Directive (EPA, 2024b). According to the EPA (EPA, 2024b), the most common water quality issue arising from agriculture is the loss of excess nutrients (phosphorus and nitrogen) from organic and inorganic fertilisers.

Pre-Consultation NIS

The landspreading of biosolids can contribute to excess nutrients in the soil and run-off of nutrients into waterbodies, if not managed appropriately and in accordance with legislative, policy and guidance/best practice requirements. However, it is worth noting that biosolids account for a relatively small proportion of fertiliser use in the agricultural sector in Ireland, as described in **Section 5.3.1**. Accordingly, the impact of nutrient losses from landspreading of biosolids will be significantly less at a national scale than that of landspreading mineral fertilisers or animal manure. However, as noted by the Sludges, Biosolids and other Organic Fertilisers Working Group (Anon, 2025), land spreading may be concentrated on a small number of farms and therefore may pose a more significant risk to individual waterbodies. Various factors such as soil pH and drainage, plant uptake and agronomic practices, as well as nutrient availability of different fertilisers can influence the fate of nutrients in the environment. Of relevance is that there are differences in nutrient availability between biosolids and mineral fertilisers (Marchuk, et al., 2023). Nutrients in mineral fertilisers are generally in a soluble form, and when applied to land are immediately plant-available. In contrast, a large proportion of nutrients in biosolids are in organic forms which must first be mineralised to become plant-available (Marchuk, et al., 2023). As a result, nutrients in biosolids are typically slow-release, and may therefore represent a less risky source of nutrients compared with other fertilisers, such as mineral fertilisers. For example, the slow mineralisation of biosolids can help maintain plant-available N during periods of rainfall when conventional fertiliser is at risk of leaching from the crop root zone in soils (Marchuk, et al., 2023).

Leaching of excess nitrogen deposited onto the soil can accelerate soil acidification (EPA, 2024a) and result in an overgrowth of plants and algae in receiving waterbodies leading to eutrophication, particularly in estuarine and coastal habitats. Loss of nitrogen and phosphorus, even very small amounts, into freshwater and estuarine systems, can lead to eutrophication. The negative effects of eutrophication on aquatic habitats and species are well documented (Moorkens, 2000; NPWS, 2019a; Doherty, et al., 2004; Hendry & Cragg-Hine, 2003; Maitland, 2003; NPWS, 2025a). Many aquatic habitats and species, including those protected under the Habitats Directive (**Table 5-5; Table 5-6**) are sensitive to the effects of eutrophication.

Air

The use of both organic and synthetic fertilisers in agriculture is known to cause emissions of greenhouse gas, nitrous oxide (N₂O), methane (CH₄) and ammonia (NH₃) to the atmosphere. Biosolids applied to soils account for a relatively small proportion of total ammonia emissions in the agricultural sector in Ireland. Based on Table 5.2. “NH₃ Recalculations for Agriculture 1990–2021” in Hyde et al. (2024), sewage sludge applied to soils accounted for c. 0.2% of the national total ammonia emissions in 2020 and 2021. Similarly, sewage sludge applied to soils accounted for 0.2% of total agriculture emissions of nitrogen oxides in 2022 (Hyde, et al., 2024). Accordingly, the impact of aerial emissions of reactive nitrogen from landspreading of biosolids will be significantly less nationally than that of landspreading of animal slurry, for example. Furthermore, whereas nitrous oxide and ammonia are emitted from soil treated with biosolids, according to Nicholson *et al.* (2021) biosolids pose a low risk of ammonia and nitrous oxide emission as a result of their low readily available nitrogen (RAN) content.

Atmospheric reactive nitrogen pollution typically impacts biodiversity through either dry deposition (occurring when nitrogen is directly absorbed into the soil or vegetation) or wet deposition (occurs when the gas combines with precipitation) (Kelleghan, et al., 2022). When above critical levels, reactive nitrogen pollution, particularly ammonia, can adversely affect habitats and species through eutrophication, acidification or direct toxicity (Kelleghan, et al., 2022). According to Kelleghan et al. (2019), the majority of SACs in Ireland have a qualifying feature that is sensitive to atmospheric ammonia with a critical level of 1 µg/m³, and modelling undertaken by the authors predicts that 80.7% of European Sites in Ireland may exceed ambient concentrations of this level. Monitoring undertaken by Kelleghan et al. (2021) confirmed critical level and critical load exceedances of Irish European Sites as a direct result of ammonia pollution from agriculture.

5.4.2.2 Heavy Metals

Heavy metals can occur in biosolids, and as a result strict limits for a suite of heavy metals have been set out in national and European legislation (see **Sections 4.3.1** and **5.2**). According to the EC (2023a), the average levels of heavy metals regulated by the SSD in sludge all remained significantly below the limits set in the SSD over 2007-2018 in EU Member States. Similar results were found in Ireland, where research undertaken as part of an EPA-funded study (Health and Water Quality Impacts Arising from Land Spreading of Biosolids), found that concentrations of metals in treated sludge from 16 WWTPs were below the maximum allowable concentrations of metals for use in agriculture in the EU (Healy, et al., 2017). However, the authors did identify priority metals (such as antimony and tin) that are not regulated in the Waste

Pre-Consultation NIS

Management (Use of Sewage Sludge in Agriculture) Regulations 1998, as amended, within some of their samples.

The latest Water Quality in Ireland report (EPA, 2025b) notes exceedances of heavy metals (mercury, cadmium, nickel, and lead) in waterbodies, identifying multiple likely sources including local historical mining and industrial sites, wastewater treatment plants, leaching from historic landfill sites or farmland following application of contaminated sewage sludges. No further detail regarding the contribution of farmland following application of contaminated sewage sludges relative to the other sources is provided.

A key consideration for this NIS is whether heavy metals can be lost to the environment from biosolid amended soils. For example, if heavy metals migrate into waterbodies, they could have toxic and potentially lethal effects on aquatic species. Heavy metals have long been known to be toxic to adult, juvenile and larval (glochidial) mussel species (Wang, et al., 2007; Markich, 2017; Khan, et al., 2018). According to NSAI (2017), the bioaccumulation of heavy metals in unionoid mussels is of concern, particularly as long-term, low concentrations of pollutants may cause problems and impact mussels over time. However, the potential effects would be dependent on concentrations of heavy metals within the waterbody, and the potential for heavy metals to leach from soils into the water environment – it is worth noting that there are specific measures included in the Regulations (namely minimum soil pH and clay content) to reduce the risk of heavy metals leaching into the water environment.

Losses of heavy metals from experimental plots amended with biosolids have been measured by Clarke *et al.* (2016). Clarke *et al.* (2016) found that in terms of water quality impacts, metal concentrations (copper, nickel, lead, zinc, cadmium and chromium) in surface-runoff from plots amended with biosolids were below their respective drinking water limits for human consumption (European Union (Drinking Water) Regulations S.I. No. 122 of 2014), and were not considered to result in a risk to human health. Some of the heavy metal concentrations reported by Clarke *et al.* (2016) within surface run-off were higher than some of the EQS set out in the Quality of Salmonid Waters Regulations (S.I. No. 293/1988 as amended) as well as the European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272 of 2009) as amended. However, these EQS represent concentrations within a waterbody (and in the case of S.I. No. 272 of 2009 the annual average concentration). Metals within surface run-off will be diluted on entry to a waterbody and therefore may not result in actual exceedances occurring.

Overall, given existing regulations, the risk of heavy metal losses to the environment from landspreading of UÉ biosolids is assumed to be low generally. However, as noted by the EPA, there is a possibility that sewage sludges could be contributing to some heavy metal EQS exceedances, particularly cumulatively with other sources e.g., industry.

5.4.2.3 Organic Contaminants

Sewage sludge can act as a sink for environmental contaminants, including certain persistent, bioaccumulative and toxic organic compounds (referred to as Persistent Organic Pollutants or “POPs”). Important emerging organic contaminants are Per- and Polyfluoroalkylated (PFAS) substances. PFAS include thousands of industrial chemicals found in everyday products including outdoor clothing and equipment, textiles, paints, food packaging, photographic coatings, non-stick coatings on cookware as well as fire-fighting foam²³. Once discharged into the urban wastewater collection system PFAS can transfer to the residual solids during wastewater treatment processes. PFAS have been identified in sewage sludge across Europe and in Ireland, with differences recorded between concentration levels of different groups and individual PFAS (Arvaniti, et al., 2024; Ma, et al., 2025). It is worth noting that there are currently no EU limits set for PFAS in sludge or biosolids.

In terms of potential effects on ecological receptors, POPs are known to be toxic to humans, animals and the environment²³. Persistent organic compounds such as some PFAS can bioaccumulate in plants, fish, and other animals. In some cases, some PFAS may biomagnify in the food chain (Bonato, et al., 2025). According to a review paper by Ankley *et al.* (2021):

“Based on information for a few relatively well-understood PFAS such as perfluorooctane sulfonate and perfluorooctanoate, there is ample basis to suspect that at least a subset can be considered persistent, bioaccumulative, and/or toxic. However, data suitable for determining risks in either prospective or retrospective assessments are lacking for the majority of PFAS”.

²³ <https://www.epa.ie/our-services/monitoring--assessment/waste/chemicals/pfas/> [accessed: 09/01/2026].

Pre-Consultation NIS

The actual risk of organic contaminants to the environment as a result of the landspreading of treated sludge has been subject to a number of assessments in Europe. A JRC study published in 2012, on levels of POP's in sludge, found that monitored POP concentrations recorded within sludge across Europe did not justify the introduction of new limit values for the considered parameters, and the observed concentrations for the emerging pollutants were generally low (Tavazzi, et al., 2012). Clarke and Smith (2011) identified a number of emerging organic contaminants for priority attention and identified perfluorochemicals (PFCs) as a “*potentially major environmental uncertainty*”. However, Clarke and Smith (2011) also noted that most risk assessments demonstrate that reuse of biosolids on land does not place human health at risk from the organic contaminants studied but recommended that this is reviewed on an ongoing basis. In Sweden, a national screening investigation of organic pollutants in sewage sludge, found that concentrations of certain contaminants increased with increasing sludge application rate (namely persistent organic substances such as brominated flame retardant (BDE-209) and perfluorooctane sulfonate PFOS), and uptake of certain contaminants by earthworms was detected. To characterize the risk for the soil ecosystem and for humans exposed via intake of crops, observed concentrations of organic substances in soil amended with sewage sludge were evaluated against critical concentrations. The risk characterisation showed that levels in soil did not pose a risk to the soil ecosystem or humans, even after long term²⁴ sludge additions (Österås, et al., 2015). More recently, the JRC identified a small set of organic pollutants that may cause significant risks to both humans and soil organisms following landspreading of biosolids, when present in concentrations typically documented for sewage sludge (Huygens, et al., 2022). Risk characterisation indicated that under a ‘reasonable worst-case’ scenario, significant risks for human health and the environment may be present, but further evidence based investigations are required to further develop and refine the risk assessment. Huygens et al. (2022) project that PAH, PCDD/F+dl-PCB, long-chain PFAS (e.g., PFOS), alkylphenols, polychlorinated alkanes (SCCPs/MCCPs), polychlorinated naphthalenes (PCNs), and phthalate acid esters are present in sewage sludges at levels that may induce human health risks. The authors acknowledge that most of these pollutants (with the exception of MCCPs) are already subject to actions and restrictions under POPs Regulation (EU 2019/1021) (as amended)²⁵ and REACH Regulation (EC 1907/2006) (as amended)²⁶. Nevertheless, the authors note that these pollutants may be restricted to a variable degree, and therefore continued releases to sewage sludge could take place. Furthermore, given that some pollutants have been phased out recently, releases to sewage sludge may continue to occur during the use or end-of-life phase of items that contain these pollutants. Many of the contaminants identified by Huygens et al. (2022) as being of concern for human health are also of concern for soil organisms. According to Huygens et al. (2022):

“the risks after a few years of sewage sludge application are minimal but gradually increase over time to significant levels in the mid- and long-term. This observation points towards the urgency to minimise the inputs of these persistent contaminants in the soil so as to ensure soil quality and continued ecosystem functioning in the long-term.”

According to Huygens et al. (2022), other substances, including most pharmaceuticals and personal care products, are considered of limited concern for human health, even at high application loads of sewage sludge, based on the available data. However, this is not necessarily the case for soil organisms (although the authors note that most pharmaceuticals are (readily) biodegradable, and therefore no accumulation of these pollutants is expected and observed in agricultural soils). The authors also identified a number of data gaps for several contaminants. These data gaps render their risk characterisation through modelling techniques incomplete, and it can therefore not be excluded that risks potentially exist for further substances (Huygens, et al., 2022).

It is possible that different risk levels for contaminants may be present across Europe, depending on local characteristics and the nature of the sludge applied to land (EEA, 2024). The EEA (2024) suggest that risk assessments should be applied at local levels to improve understanding of potential impacts, and levels of substances of concern in soil should be monitored to prevent risks arising from long-term applications. The EPA's report on Ireland's update of the National Implementation Plan for the Stockholm Convention on POPs provides some information regarding the concentrations of POPs recorded in sludge in Ireland. The report notes that the results confirmed the presence of POPs in low quantities and significantly lower than

²⁴ The studied fields are noted as receiving sludge every sixth year since 1978, or every fourth year since 1981.

²⁵ The POPs Regulation restricts a range of substances and requires waste containing specified levels of POPs to be treated so the POPs are destroyed and aims to limit releases of unintentionally produced POPs into the environment.

²⁶ REACH is the Regulation for Registration, Evaluation, Authorisation and Restriction of Chemicals, and aims to streamline and improve the former legislative framework on chemicals in the EU. The REACH covers virtually all substances (hazardous and non-hazardous) manufactured, imported and used within the EU. It places greater responsibility on industry to manage risks that chemicals may pose to human health and the environment.

Pre-Consultation NIS

the specific Low POPs Concentration Limit (LPCLs) specified in Annex IV of the EU POPs Regulation (EPA, 2018). Recent research has identified PFAS in biosolids and river/estuarine sediments in Ireland (Ma, et al., 2025). The authors found that the relative abundance of different PFAS classes differed significantly between biosolids and sediments and note that this difference suggests that biosolids/WWTPs are just one of many possible sources of PFAS in Irish sediments.

In summary, a recent European risk assessment of organic pollutants and environmental impacts from sewage sludge management indicates that there is a small set of organic pollutants that may cause significant risks to both humans and soil organisms following landspreading of biosolids (Huygens, et al., 2022). Water-dependant organisms are also potentially at risk where organic contaminants within biosolids are mobile in the environment. However, (limited) EPA monitoring of sludge indicates low levels of at least some POPs in sludge in Ireland. Given the data gaps (e.g., monitoring data for a greater suite of contaminants in sludge in Ireland and well as data regarding the concentration of contaminants in soils, sediments and waterbodies in catchments where biosolids are landspread), lack of toxic thresholds for some contaminants for species, and lack of limits for organic contaminants in sludge (there are currently no limits for levels of organic pollutants specifically relating to treated biosolids used in agriculture), there remains uncertainty with regards to the potential risk to European Sites from losses of organic contaminants from biosolids amended soils.

5.4.2.4 Microplastics

Microplastics (small fragments of plastic < 5 mm in size) are recognised as an emerging threat to environmental health. There are many sources of microplastics in the environment, such as synthetic clothing, plastic mulching in agricultural soils, AstroTurf pitches, construction sites and abrasion of synthetic rubber tyres. Urban wastewater treatment plants (UWWTP) act as a sink for microplastics which enter the sewage network from various sources including urban runoff, industry and domestic households. The destination for the majority of microplastics released to sewers is sewage sludge (Mahon, et al., 2017). Biosolids are considered a source of microplastics in Irish soils (Nash, et al., 2023). Laboratory tests undertaken by Nash et al. (2023) indicate that microplastics can be transported from soils into waterbodies via overland movement, however, various factors such as the presence of a grass sward, slope and rainfall intensity can influence the concentrations of microplastics exported. Furthermore, ploughing on agricultural land is considered likely to contribute to the vertical migration of microplastics in soils, but this pathway appears to carry low risk of groundwater contamination (Nash, et al., 2023). Other contaminants potentially occurring in biosolids (e.g., metals, organic contaminants) can adsorb to microplastic particles (Huygens, et al., 2022), however the relative contribution of microplastics as vectors for such contaminants remains to be evaluated (Hooge, et al., 2023).

As an emerging contaminant, the impacts of microplastics are not yet fully understood, and there is currently no standard method available to measure microplastics in wastewater samples²⁷. As noted by Provencher *et al.* (2020), although microplastics have been found within most environmental systems, the implications of microplastics in the environment are not clear, with some studies suggesting negative impacts to organisms, while others find neutral outcomes. For example, research in the UK found microplastics are ingested by larval lamprey (*Lampetra* sp.) and occur within their habitat, however the consequence of this ingestion was not clear (Rendell-Bhatti, et al., 2023). In addition, whereas Hooge et al. (2023) note that adverse impacts on the soil environment from microplastics are likely to occur if microplastic concentrations exceed certain thresholds, the authors also note that experimental data within this field is sparse, and the microplastic concentrations used in most studies are much higher than concentrations observed in the soil environment. Therefore, according to the authors, the actual risk of microplastics for soil health is still unknown (Hooge, et al., 2023). Huygens et al. (2022) note that the majority of studies indicate that microplastics have a negative impact on soil organisms, but with some uncertainties regarding outcomes.

When emitted into surface waters, microplastics can adhere to floating vegetation and be ingested by a range of freshwater organisms and transfer through the foodweb (Mateos-Cárdenas, et al., 2021; Mahon, et al., 2017; Nash, et al., 2023). However, short-term microplastic exposure studies undertaken by Mateos-Cárdenas, et al. (2021) did not detect effects on plant growth or photosynthesis of duckweed (*Lemna minor*), or mobility impairment or mortality of freshwater shrimp (*Gammarus duebeni*). However, the study did demonstrate that microplastics can be adsorbed onto the external surface of duckweed, and ingested polyethylene microbeads were found to be rapidly fragmented by *G. duebeni* resulting in the production of

²⁷ Available at: <https://ukwir.org/sink-to-rive-to-tap> [Accessed: 12/03/2026].

Pre-Consultation NIS

nanoplastics (<1µm). The effects of these subcellular-sized nanoplastics on organisms are unknown (Mateos-Cárdenas, et al., 2021). As part of an Irish EPA funded study, Mahon et al. (2017) undertook a risk assessment of the potential risks posed by microplastic pollution to selected protected species, and the results are shown in **Table 5-7**. Mahon et al. (2017) identified twenty-four species of molluscs, fish, birds, mammals and crustaceans as being potentially at risk from microplastic pollution in Ireland, with potential risks categories ranging between “low” and “high” risk. The freshwater pearl mussel (*Margaritifera margaritifera* and *Margaritifera durrovensis*) is considered to be potentially at high risk from microplastic pollution. According to Mahon et al. (2017), the high risk assignment for this species is because of the body of literature on the occurrence, retention and effects of microplastics on similar marine species (blue mussel *Mytilus edulis*), and its occurrence in Irish river catchments identified as having potentially high exposure.

Microplastics do occur in sewage sludge, and experimental research undertaken by Nash et al. (2023) indicates microplastics can be lost to the water environment via overland run-off. However, Nash et al. (2023) also note that further research is needed to fully quantify the export of microplastics from terrestrial systems, and to understand the level of risk this poses to aquatic systems. Overall, it is considered in this NIS that a risk to ecological receptors as a result of losses of microplastics from biosolids-amended soils exists, however the level of risk is currently uncertain and more evidence-based research is required to better understand the risks.

Table 5-7: Potential Microplastics Risk Categories for Some Protected Species Listed on the Habitats Directive (HD), Birds Directive (BD) and the Relevant Red Lists. Extracted from Mahon et al. (2017).

Protected Species	Low	Medium	High	Very High
Lake orb mussel (<i>Musculium lacustre</i>) (VU)	X			
Sand-bowl amber snail (<i>Quickella arenaria</i>) (EN)	X			
Swamp orb mussel (<i>Sphaerium nucleus</i>) (VU)		X		
Swan mussel (<i>Anodonta cygnea</i>) (VU)*				
Desmoulin’s whorl snail (<i>Vertigo moulinsiana</i>) (HD)		X		
Freshwater pearl mussel <i>Margaritifera margaritifera</i> (HD)			X	
Nore freshwater pearl mussel (<i>Margaritifera durrovensis</i>) (HD)			X	
River lamprey (<i>Lampetra fluviatilis</i>) (HD)		X		
Brook lamprey (<i>Lampetra planeri</i>) (HD)		X		
Atlantic salmon (<i>Salmo salar</i>) (HD)		X		
Eurasian otter (<i>Lutra lutra</i>) (HD)		X		
White-clawed crayfish (<i>Austropamobius pallipes</i>) (HD)		X		
Pollan (<i>Coregonas autumnalis pollan</i>)		X		
Twaite shad (<i>Alosa fallax</i>) (HD)		X		
Pintail (<i>Anas acuta</i>) (BD)	X			
Shoveler (<i>Anas clypeata</i>) (BD)	X			
Tufted duck (<i>Aythya fuligula</i>) (BD)	X			
Pochard (<i>Aythya farina</i>) (BD)	X			
Scaup (<i>Aythya marila</i>) (BD)	X			
Common scoter (<i>Melanitta nigra</i>) (BD)	X			
Snipe (<i>Gallinago gallinago</i>) (BD)	X			
Hen harrier (<i>Circus cyaneus</i>) (BD)		X		
Golden eagle (<i>Aquila chrysaetos</i>) (BD)		X		
Kingfisher (<i>Alcedo atthis</i>) (BD)		X		

*risk category missing in Mahon et al. (2017) for this species

6 APPROPRIATE ASSESSMENT

6.1 Introduction

The assessment of the draft Strategy has been completed in the context and with reference to the legislation and guidance set out in **Section 1.1** and **Section 3** alongside the scientific evidence base set out in **Section 5** and summarised in **Section 5.1**. The assessment considers the potential for adverse effects on the integrity of European Sites, with reference to their Conservation Objectives, from the implementation of the draft Strategy, through its technical strategies and strategic objectives, aims and actions. European Commission guidance states that the integrity of a site involves its ecological functions (EC, 2021a). The decision as to whether its integrity is adversely affected should focus on, and be limited to, the site's Conservation Objectives. Given the lack of geographic specificity of the measures/actions contained within the draft Strategy and given its strategic nature, the focus has been on the broad intention of Conservation Objectives more so than Site Specific Conservation Objectives of individual European Sites. The actual or potential adverse effects on the integrity of European Sites have been identified in the absence of any mitigation measures and with reference to the precautionary principle.

6.2 Approach to Assessment of the Draft Strategy

The draft Strategy is a Tier 2 Plan of the WSSP (Tier 1). The Tier 2 draft Strategy presents the implementation plan specifically for wastewater sludge management. Specific projects and activities necessary to fulfil provisions in this draft Strategy and other Tier 2 plans will be detailed at a lower tier (Tier 3). The assessment in this case is focussed on those impacts that can be reasonably determined at this strategic level. Where detail is not available at this stage and the assessment cannot reasonably determine the potential significant effects in a meaningful way, or where AA at a lower tier in relation to defined planning and licencing regimes is required, this has been indicated. This assessment is focussed on the potential effects of the draft Strategy on the integrity of European Sites.

This stage of the AA comprises three main steps, namely:

- **Impact prediction** (the likely impacts of the draft Strategy are examined);
- **Assessment of effects** (the impacts of the draft Strategy are assessed with regards to whether they could have any adverse effects on the integrity of European Sites); and
- **Mitigation measures** (identification of mitigation measures where necessary to address any actual or potential adverse effects).

6.3 European Sites Assessed by the NIS

To determine the likely significant effects of the draft Strategy and, if likely significant effects are identified, whether adverse effects will affect the integrity of European Sites with reference to their Conservation Objectives from the implementation of same, it is necessary to identify which European Sites are likely to be affected by the draft Strategy. Given the national and strategic nature of the draft Strategy and the overall lack of geographical specificity of its measures, all of the European Sites (Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) within Ireland and relevant sites and receptors in Northern Ireland are considered.

In the Republic of Ireland, there are 441 SACs which are designated for one or more of 59 habitat types (Annex I of the Directive), 16 of which are designated for 'priority' habitats owing to their ecological vulnerability; and/or 24 species (Annex II of the Directive) of which one or more are included as qualifying interests. There are also 167 SPAs. These data are based on the most recent SAC and SPA data sheets available on the NPWS website²⁸ and NPWS Article 17 Reporting (NPWS, 2025a). These European Sites are set out in **Appendices B** and **C**.

²⁸ Available at: <https://www.npws.ie/maps-and-data/designated-site-data/sac-and-spa-datasheets-downloads> [Accessed 20/01/2025]

Pre-Consultation NIS

Although not strictly required when considering Article 6(3), all the former European Sites within jurisdiction of Northern Ireland are also considered by this assessment despite these designations no longer forming part of the pan-European Natura 2000 network²⁹. Out of an abundance of caution, this is considered prudent and practical, mindful of the potential trans-boundary impacts and effects of the draft Strategy on these former European Sites within Northern Ireland. In Northern Ireland there are 58 former SACs and 16 former SPAs. These former European Sites are set out in **Appendices D and E**.

It is noted that the draft Strategy will only export biosolids outside the State as a short-term emergency option. Transboundary effects were considered if such exports were to other Member States, however the risk of such effects on the integrity of European Sites within those Member States were considered infinitesimal due to the short-term and emergency nature of any exports and mindful that other Member States would be under similar, strenuous, EU legislative and policy requirements as Ireland (as documented in **Section 4.3** and **Section 5**) regarding the management of biosolids within those Member States. Therefore, no other transboundary European Sites in other Member States were considered relevant to this assessment and this is considered a proportional and suitably precautionary response to the matter mindful of the level of risk identified.

Given the national and strategic nature of the draft Strategy, a detailed assessment of individual European Sites and their respective QIs or SCIs is not practical. However, the QIs and SCIs that may be most sensitive to the impacts and effects of the draft Strategy and any actions/activities arising from it are highlighted in **Section 5.3**.

Table 6-1 below provides a summary breakdown of the number of European Sites in the Republic of Ireland and the former European Sites in Northern Ireland. **Figure 6-1** illustrates the distribution of European Sites in Ireland (inland and coastal sites). It is acknowledged that the number of European Sites designated, and their boundaries, are subject to change over time and must therefore be verified on an ongoing basis.

Table 6-1: European Sites in the Republic of Ireland and former European Sites in Northern Ireland.

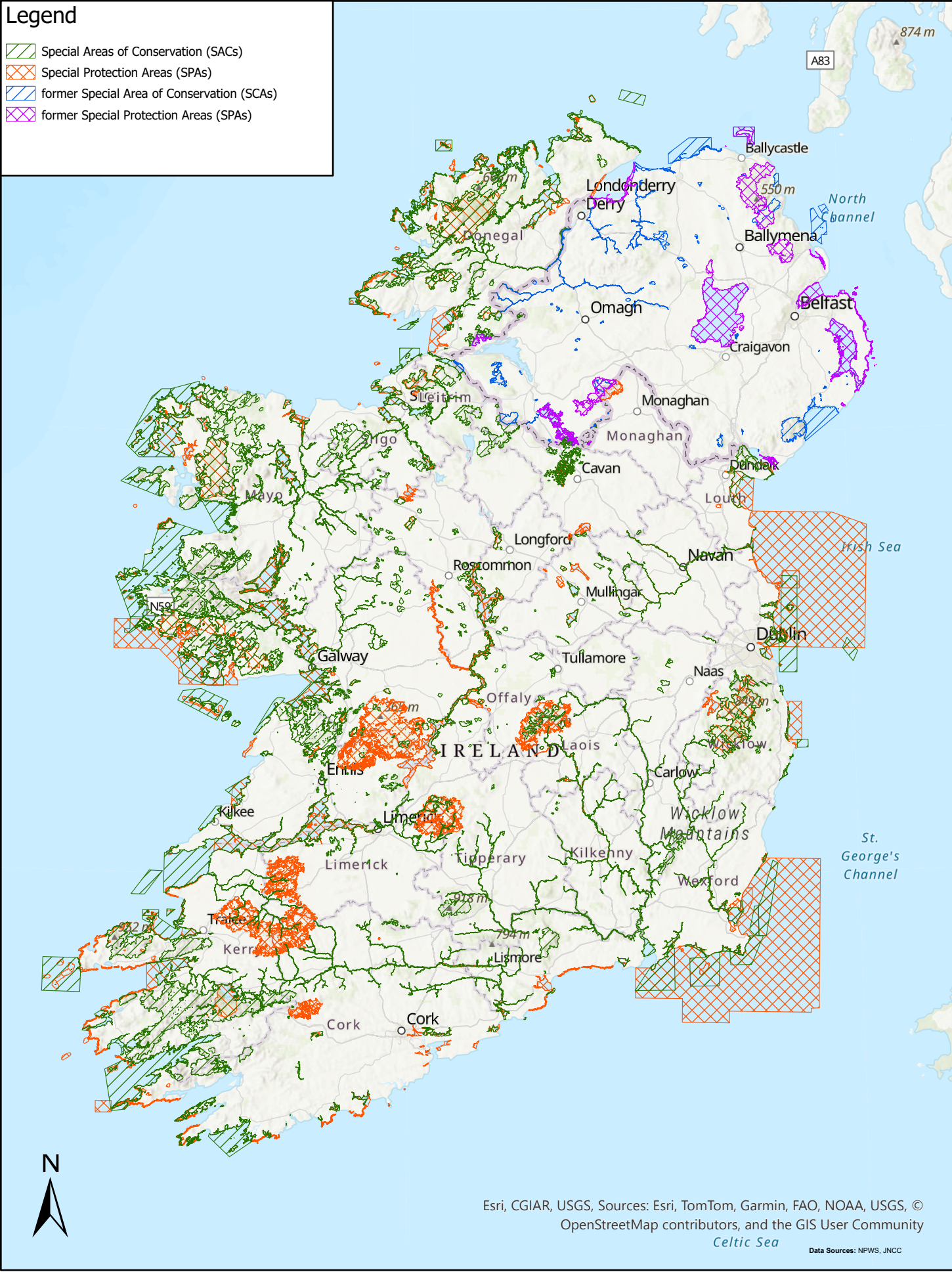
European Sites	Republic of Ireland	Northern Ireland
Special Areas of Conservation (SAC)	441	0
Special Protection Area (SPA)	167	0
Former SACs	0	58
Former SPAs	0	16

Data Source: ROI: NPWS website (www.npws.ie data retrieved January 2026); NI: JNCC (<https://sac.jncc.gov.uk/site/northern-ireland> & <https://jncc.gov.uk/our-work/list-of-spas/#northern-ireland> data retrieved January 2026).

²⁹ Since 1 January 2021 SACs and SPAs in the UK (including Northern Ireland) are no longer part of the Natura 2000 network as illustrated in mapping <https://natura2000.eea.europa.eu/>

Legend

- Special Areas of Conservation (SACs)
- Special Protection Areas (SPAs)
- former Special Area of Conservation (SCAs)
- former Special Protection Areas (SPAs)



Esri, CGIAR, USGS, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community
Celtic Sea
 Data Sources: NPWS, JNCC

Title
Figure 6-1:
European Sites

Project
 National Bioresources Strategy

Client

 Irish Water

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Issue Details	
Drawn By: MV	Project No. IE000883
Checked By: SA	Date: 19/03/2026
Approved By: CW	File Ref: IE000883-RPS-AP-XX-R-EN-0001
Scale: 1:2,100,000 @ A4	
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6.3.1 Maintain versus Restore Favourable Conservation Status

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest.

Favourable conservation status of a habitat is achieved when:

- Its natural range, and area it covers within that range, are stable or increasing, and
- The specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- The conservation status of its typical species is favourable.

Favourable conservation status of a species is achieved when:

- Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

The NPWS provides site-specific conservation objectives which aim to define favourable conservation status for a particular QI/SCI at a given European Site. These conservation objectives are used for AA of plans or projects and can provide useful information for conservation management planning.

Habitats/species that are currently in favourable condition at a particular site would be considered to have an adequate current level of maintenance to support its defined favourable condition. Because of this, they may be less vulnerable to negative effects than a habitat/species that needs to be restored. However, it is important to note that maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level. Therefore, any impacts on a habitat/species at a site may contribute to impacts on the favourable condition of that habitat/species on a national scale.

6.4 Prediction of Effects

6.4.1 Context for Impact Prediction

The draft Strategy sets out a strategy for the sustainable management of bioresources in Ireland and how that can be achieved. However, the draft Strategy has potential to adversely affect the integrity of European Sites given the nature of the objectives it presents. As the draft Strategy is focused on a national scale and strategic level, the potential is generally not for direct or location impacts but rather indirect impacts arising from the implementation of various national policy objectives or technical strategies. **Section 6.4.2** identifies the main potential impacts and effects that could arise for European Sites from the implementation of the draft Strategy.

6.4.2 Impact and Effect Identification

A summary of the main potential ecological impacts that could arise from the implementation of the draft Strategy are presented below and are used in the impact prediction.

- **Loss or changes in ecosystem process** upon which QI habitats and species and SCI species populations are dependent e.g. sediment mobilisation/deposition, release of pollutants/adverse changes in water quality or air quality, introduction/spread of invasive alien species.
- **Loss, deterioration and/or fragmentation of habitats.** Such impacts could be immediate or gradual over time.

Pre-Consultation NIS

- **Change in species populations/assemblages:** This could arise due to changes in habitat, mortality/injury and loss/disturbance of key features for breeding, feeding and resting. This includes inter-dependency of species on other species and/or habitats e.g. foraging resources of certain bird species or life-cycle inter-dependency between salmonids and freshwater pearl mussel.
- **In-combination impacts and effects.**

6.4.3 Impact and Effect Prediction

In line with the methodology for impact prediction outlined in **Section 3**, the main ecological impacts that could potentially arise from implementation of the draft Strategy are discussed in detail in **Section 6.4.4** and summarised **Table 6-2**. In-combination impacts are assessed separately in **Section 6.5**. It is acknowledged that the draft Strategy is a high-level strategy document and, as such, prediction of effects at individual European Sites is not practical as the draft Strategy lacks the necessary spatial detail to give context to the extent or significance of any potential effects. As such, the potential for effects is raised within the confines of the draft Strategy, with a view to appropriately informing lower levels of planning, where the necessary spatial detail is available and identifying the mitigation measures that must be in place for lower-tier plans and projects to ensure the protection of European Sites is possible.

As set out in the Habitats Directive, the assessment, at this stage, must focus on whether the plan will “adversely affect the integrity” of European Sites. Where adverse effects are uncertain, the precautionary principle is applied, and the potential for adverse effects is assumed. This approach is in-keeping with the guidance document Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities (DEHLG, 2009, revised 2010), which states:

“It is important that the NIS applies the precautionary principle and the focus of the statement should be on demonstrating objectively, with supporting evidence, that there will be no adverse effects on the integrity of the Natura 2000 site. Where this cannot be demonstrated, adverse effects must be assumed and the Statement must reflect that.”

6.4.4 Assessment of Effects

The draft Strategy includes four broad strategic objectives, namely:

- Sustainable management of wastewater sludge and bioresources;
- Protect and restore our environment;
- Support our communities, growth and the bioeconomy;
- Efficient operation of wastewater sludge and bioresources centres.

These are high level strategy objectives. Under each strategic objective, strategic aims have been identified (these are set out in **Table 4-2**), and for these aims, specific actions have been set out. Given the high-level nature of the strategic objectives and aims, it is not possible to identify whether any effects on European Sites will occur as a result of them. The main thrust of these objectives and aims is positive from an environmental perspective. The actions associated with each strategic objective/aim are assessed in **Table 6-3** below. An assessment of the key technical strategies which underlie the actions proposed within the draft Strategy (treatment, transport and reuse/recycling) is included in **Section 6.4.4.1** below.

6.4.4.1 Technical Strategies within the draft Strategy

In addition to specific actions within the draft Strategy, a number of technical strategies underlie the actions proposed. These include (1) treatment infrastructure and processes, (2) transport and (3) reuse/recycling of biosolids. The potential effects of these technical strategies on European Sites are summarised in **Table 6-2** and discussed below.

6.4.4.1.1 Treatment Infrastructure and Processes

The key aspects of the draft Strategy regarding treatment infrastructure and processes that could lead to adverse effects on the integrity of European Sites are generally project specific. For example, the provision of new infrastructure or infrastructure upgrade projects could result in adverse effects on the integrity of

Pre-Consultation NIS

European Sites through loss or disturbance of habitats or species. The key infrastructure that may be required as part of the draft Strategy includes, but is not limited to:

- Satellite Dewatering Centres (SDCs);
- Bioresources Centres (BCs);
- Energy recovery infrastructure (e.g., AD)
- Storage facilities for biosolids; and
- New facilities at existing BCs and SDCs to allow these facilities to accept liquid sludge (e.g., additional tanker unloading bays, sludge blending tank, weighbridge etc.).

Whereas some of the potential new infrastructure or infrastructure upgrades arising from implementation of the draft Strategy are not location specific (e.g. it is noted in the draft Strategy that the National Bioresources Decision Support Tool is and will be utilised to optimise site selection of the SDCs), the draft Strategy does set out a number of locations for regional BCs based on a feasibility study undertaken by UÉ. The feasibility study considered technical, environmental, planning, and financial criteria to help select suitable sites. Site characteristics such as restricted access, risk to European Sites, impacts on receptors, availability of space and economic feasibility were considered in the final site selection. Five preferred sites for new regional BCs were ultimately selected following a comparative assessment - Cork Lower Harbour, Limerick, Waterford, Tullamore, and Sligo WWTPs (**Figure 6-2**).

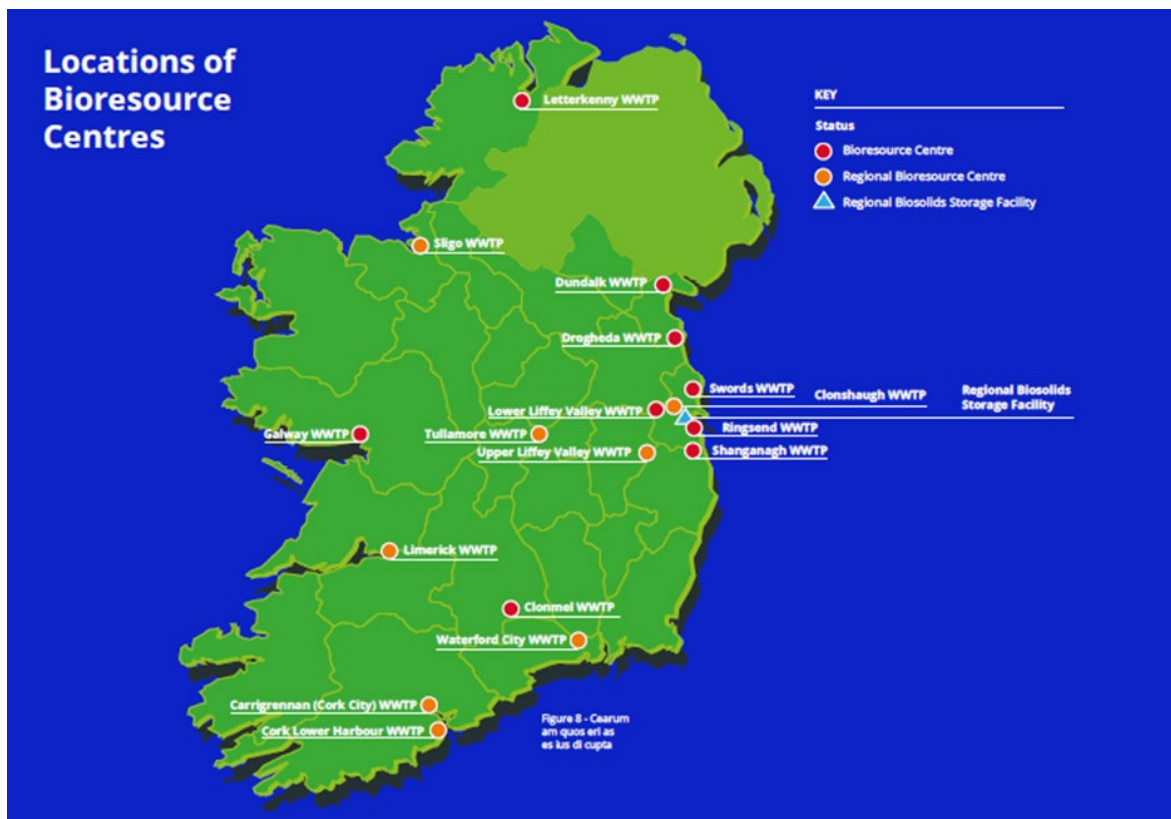


Figure 6-2: Shows the Locations of Bioresource Centres

UÉ has committed in the draft Strategy to consideration of the implications of activities stemming from the bioresource management process on European Sites. The draft Strategy states:

“Further to our commitments in our Biodiversity Action Plan (BAP), and in recognition of wider issues relevant to protection of biodiversity, that are not covered under the Habitats Directive, e.g. ecological networks, disturbance of habitats and species etc., we will ensure that whilst carrying out bioresources management activities that they will comply with the obligations under the Birds and Natural Habitats Regulations 2011-2016 and the mitigation measures within the SEA and NIS documents.”

It is noted that new facilities and infrastructure including upgrades will be subject to the usual planning development controls, licencing regime, and legal requirements for environmental assessment including Appropriate Assessment associated with all wastewater treatment facilities. Full planning would be required

Pre-Consultation NIS

for the 5 regional BCs listed above, for example. Given UÉs commitment to consideration of European Sites as part of the bioresources management process, the commitments in UÉs Biodiversity Action Plan and provided new infrastructure or infrastructure upgrade projects are subject to rigorous planning procedures, such projects arising from the draft Strategy in principle should not result in adverse effects on the integrity of European Sites.

Sludge volume reduction and thickening is a key part of the sludge management process, and this is typically undertaken at SDCs or WWTPs. The draft Strategy notes that in some cases, technologies such as containerised dewatering units or mobile dewatering units are suitable for reducing wastewater sludge volumes where a permanent dewatering installation is not economically justified e.g. at smaller size plants. Strict controls are implemented during the operation of these units, which are operated in accordance with a site Wastewater Discharge Authorisation, which is itself subject to AA.

Overall, the draft Strategy includes a commitment that all activities associated with bioresources management will be in compliance with the Birds and Natural Habitats Regulations.

Furthermore, projects will be subject to usual planning and licencing controls, including, where relevant, consideration of Article 6 of the EU Habitats Directive as it relates to Appropriate Assessment. Accordingly, projects or activities arising from the draft Strategy will be consistent with the protections afforded to European Sites under the Habitats Directive; including the provisions of Articles 6(3) and 6(4). **Adverse effects on the integrity of European Sites as a result of the treatment infrastructure and processes element of the draft Strategy are therefore not predicted and mitigation measures are not required.**

6.4.4.1.2 Transport

The key aspects of the draft Strategy regarding transport that could lead to adverse effects on the integrity of European Sites relate to the day-to-day activities related to the management of bioresource. For example, the transport of sludge to designated satellites or BCs could result in adverse effects on the integrity of European Sites in the event of an accidental spill or road traffic accident.

As noted in **Section 5.2.2**, transport associated with sludge/biosolids management is regulated to ensure safe transportation of biosolids and/or sludge. The Waste Management Act is the primary legislation governing waste management in Ireland. It provides the legal framework for the collection, transport, and disposal of waste. Further relevant legislation includes but is not limited to; European Communities (Waste Directive) Regulations 2011 (S.I. No. 126/2011) as amended and Waste Management (Collection Permit) Regulations 2007 (S.I. No. 820/2007) as amended. According to the draft Strategy, UÉ Sludge Framework Contractors carry out all elements of the works related to the transportation of sludge to UÉ satisfaction and in accordance with current legislation and regulations. The economic and environmental cost of transporting wastewater sludge and biosolids is a key consideration in the draft Strategy. Two relevant actions within the draft Strategy are actions 4.5 and 2.1. Action 4.5 aims to “*Continue to develop a National Bioresource Decision Support Tool, optimising low carbon transport.*” Carbon emissions of main transport and treatment activities is an element in the Decision Support Tool. The DST enables UÉ to evaluate and optimise transport strategies. Action 2.1 is to “*Implement nature-based solutions such as sludge reed beds (SRBs) on smaller sites (<2 P.E.), and SRBs are considered on all capital projects.*” Sludge Reed Beds (SRBs) are particularly beneficial in smaller remote WWTPs where the transport of sludge to a satellite dewatering site is unsustainable. It is also noted that, where practicable, biosolids are transported and spread on the nearest suitable spread lands to the WWTP, which further reduces transport requirements. The draft Strategy does note, however, that this needs to be supported by suitable strategic storage for periods when land spreading is not allowed. Storage could be accommodated at BCs or at dedicated storage facilities.

Considering the existing regulations pertaining to transport of sludge or biosolids, the use of the DST to optimise transport of sludge/biosolids nationally, and the proposal to implement nature-based solutions such as SRBs in projects (which can ultimately reduce transport needs and emissions), **adverse effects on the integrity of European Sites from the transport element of the draft Strategy are not anticipated. Mitigation measures are not required.**

6.4.4.1.3 Reuse/Recycling of Biosolids

Agriculture – Overview of Potential Effects

In terms of the reuse/recycling of biosolids, the key potential impacts relate to losses of nutrients and contaminants to the environment. As noted previously, 100% of treated wastewater sludge is currently reused on agricultural land in Ireland. Potential effects arising from this stage in the process are widespread

Pre-Consultation NIS

geographically and are not project specific. The landspreading of treated sludge onto agricultural land is regulated in Ireland through the Waste Management (Use of Sewage Sludge in Agriculture) Regulations (as amended), European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2025, as well as the Codes of Good Practice for Use of Biosolids in Agriculture. As noted previously, biosolids account for a relatively small proportion of fertiliser use in the agricultural sector in Ireland (see **Section 5.3.1**). The main pollutants associated with biosolids that, if present, may present a risk to ecological receptors following landspreading are discussed in **Section 5.4.2**, and include nutrients, heavy metals, organic contaminants, emerging contaminants and microplastics.

There are some uncertainties with regards to the concentrations of various contaminants in biosolids, as well as the fate and transport of contaminants (if present) within biosolids in the environment following landspreading (e.g., emerging contaminants, microplastics). However, in general it is assumed that the main pathway to European Sites would be via hydrological/hydrogeological pathways to waterbodies or wetlands or directly if biosolids were spread onto agricultural land within an SAC or SPA. It is worth noting here that landspreading directly within an SAC or SPA could be an Activity Requiring Consent (ARC – see **Section 5.2.3** for more detail), however consent would not be required on established reseeded grassland or cultivated land provided it is greater than 20m from a river, stream or floodplain; or greater than 50m from a wetland, lake, turlough or pond. To a lesser extent and at a more localised scale, aerial pathways are also relevant where SACs sensitive to aerial deposition of reactive N are present and the habitats and species therein are nearing or exceeding thresholds. Nutrients, particularly reactive nitrogen, can be lost to air during landspreading activities.

As set out in **Section 5.2**, various measures are already in place to address the risks associated with the landspreading of biosolids. Much of this legislation relates to the protection of soils and water. However, as noted previously, the SSD; the regulations which transpose this Directive into Irish law (Waste Management (Use of Sewage Sludge in Agriculture) Regulations) 1998, as amended; and the Codes of Good Practice for Use of Biosolids in Agriculture, currently do not regulate certain contaminants which are found in sludge, and which could pose a risk to the environment (see **Section 5.4.2**); however it is understood that further evidence-based research is ongoing and required to fully understand potential risks. As noted in the SSD evaluation *“the SSD continues to be relevant and it is supported by stakeholders. However, the list of contaminants which it regulates would need review, notably considering organic compounds, pathogens, pharmaceuticals, and microplastics which are present in sewage sludge. The risks which they pose when sludge is used on farmland needs to be assessed and addressed through risk management measures”* (EC, 2023a). As a result, the potential ecological implications of the recycling/reuse of biosolids on agricultural land requires careful consideration.

It should be noted that UÉ are engaging with regulators and stakeholders regarding the development of a revised Code of Good Practice for the Use of Biosolids in Agriculture (Action no. 2.6 of the draft Strategy). A multi stakeholder working group including UÉ was set up in 2024 to review and update the Code of Good Practice for Use of Biosolids in Agriculture to consider developments in monitoring requirements and technologies. Furthermore, as noted in the draft Strategy, the SSD is proposed to be updated in the coming years. The National Bioresources Strategy will be reviewed, and updated if required, when the revised SSD comes into effect. The proposed revisions to the Code of Good Practice and SSD are likely to have beneficial environmental effects, however, given that these revisions have not yet been completed or implemented, these revisions have not been considered in the assessment presented below.

Agriculture – Nutrient Losses as a result of landspreading

It is well established that inappropriate and inaccurate landspreading of fertilisers from any source can result in losses of nutrients to the environment, which can negatively affect water quality as well as air quality. Inappropriate application of biosolids (as well as biochar or hydrochar - the carbon-rich byproducts from HTC, pyrolysis, or gasification - should this occur³⁰) could therefore result in losses of nutrients to the environment and consequently have negative effects on European Sites and the habitats and species for which they have been designated.

The landspreading of biosolids is regulated under the NAP and implementation of the GAP Regulations. The NAP and GAP Regulations are specifically designed to prevent pollution of surface waters and ground water from agricultural sources (namely fertilisers) and to protect and improve water quality. The NAP and GAP Regulations are predominantly concerned with the protection of water from nutrients entering waterbodies

³⁰ According to the draft Strategy, both outputs are in the initial stages of building a regulatory, scientific and market proposition for deployment rather than being established practices.

Pre-Consultation NIS

through overland flow and leaching to groundwater, however, aerial emissions are addressed indirectly in the NAP and GAP Regulations, for example through restrictions on the ploughing of land and the use of Low Emission Slurry Spreading (LESS) equipment for landspreading.

The NAP is subject to AA at each cycle and accordingly, **adverse effects on the integrity of European Sites arising from nutrient losses from the landspreading of biosolids, is assessed (and mitigated as required) as part of the AA process carried out on each cycle of the NAP and is not considered further here**; the NAP is only approved if it satisfies the requirements of Article 6 of the EU Habitats Directive. In addition, biosolids may only be spread on agricultural land in accordance with a NMP as set out in the Waste Management (Use of Sewage Sludge in Agriculture) Regulations 1998 as amended. The NMP manages the application rates of nutrients and determines the maximum permissible rate of application of nutrients at a local level. This in turn reduces the risk of the application of excess nutrients and therefore losses to the environment.

Agriculture – Contaminant Losses as a Result of Landspreading

As noted previously, sewage sludge can act as a sink for contaminants released to the environment. As some of these contaminants are not removed during conventional treatment processes (e.g., lime stabilisation, anaerobic digestion), there is a risk that these contaminants, if they are present in sludge, could be released to the environment if the treated sludge is spread onto agricultural lands. Nevertheless, UÉ has been auditing the landspreading of biosolids for over 20 years, and no evidence has been brought forward by UÉ suggesting that landspreading biosolids is an issue in an Irish context. In addition, existing measures set out in the GAP Regulations as well as the Codes of Good Practice for the Use of Biosolids in Agriculture to protect water quality are likely to work towards reducing the risk of contaminant losses. However, it is noted that the Code of Good Practice for the Use of Biosolids in Agriculture requires updating (Anon, 2025), and GAP regulations mainly focus on nutrient losses from agricultural land, as opposed to contaminants such as microplastics or organic pollutants. Therefore, there is uncertainty as to whether these measures are sufficient to remove the risk of losses of potential contaminants in biosolids to the environment.

Landspreading of biochar or hydrochar (should this occur³⁰) could also result in contaminant losses to the receiving environment. However, it is worth noting that incineration at high temperatures effectively removes all priority pollutants from sludge (Huygens, et al., 2022). Accordingly, depending on the operating temperature of the process used to create biochar or hydrochar, these byproducts can contain less contaminants than sludge which has been treated with conventional methods (e.g., anaerobic digestion or lime stabilisation), or potentially none. As set out in **Section 5.4.2**, there are a number of contaminants that potentially occur within biosolids. However, the presence of a contaminant does not always result in a toxicological concern (Carter, et al., 2025). As noted by Carter et al. (2025), a certain concentration (or threshold) for a chemical contaminant (e.g. pharmaceutical) must be reached in order to elicit an effect and thus pose a risk. Nevertheless, potential risks to the environment from the landspreading of sewage sludge have been identified (Huygens, et al., 2022). Furthermore, although it is acknowledged that biochar and hydrochar are likely to contain less contaminants than biosolids treated through conventional methods (possibly none), the final contaminant load will be influenced by the operating temperature of the process used to create the product. Accordingly, there is no certainty in the absence of detail regarding operating temperatures, whether biochar or hydrochar will contain contaminants. Overall, it is considered by this assessment that a risk to ecological receptors as a result of losses of contaminants from biosolids-amended soils exists, however the level of risk, and whether adverse effects on the integrity of European Sites could occur, is currently uncertain. The European Sites potentially affected are likely to include those where biosolids are applied directly to lands within the site (considered unlikely mindful that where the activity is considered an ARC, consent must be granted by the Minister for Housing, Local Government and Heritage or by another relevant public authority), or those with water-dependant habitats and species with connectivity to the source of application of the landspread biosolids. In the absence of certainty regarding the potential or not for adverse effects, the precautionary principle has been applied, **and it is considered that the potential for adverse effects on the integrity of European Sites exists**. Accordingly, mitigation measures are required and set out in **Section 7**.

Other Reuse/ Outlets

To demonstrate increased resilience, mitigate risk of reduced agricultural land bank availability, and to meet sustainability ambitions, UÉ have reviewed and are progressing alternative options for bioresource management. Alternative outlets for reuse/recycling of treated biosolids in Ireland include (but are not limited to) ATC technologies, reuse in industry, use in energy crops, silviculture and land remediation. Some of the alternatives (e.g., the latter three) move biosolids away from the food chain but since they involve the

Pre-Consultation NIS

landspreading or use of biosolids for land remediation, they have the same potential effects on European Sites as those that could arise from landspreading onto agricultural lands. Uisce Éireann are at varying stages of progressing these outlets.. Whereas some of the alternatives may be project specific (e.g., landfill capping, mine restoration), others are not (e.g., spreading of biosolids on lands growing energy crops, landspreading within forestry, potential future landspreading of biochar or hydrochar).

Project specific outlets (e.g., landfill capping) would be subject to strict planning procedures, Emission Limit Values (ELVs) set out in licences (where appropriate) or at the very least screening for AA, as set out in **Section 6.4.4.1.1** above. Accordingly, such projects arising from the draft Strategy in principle should not result in adverse effects on the integrity of European Sites. However, there is uncertainty regarding the potential effects from non-project specific outlets that involve non-agricultural land use options for biosolids, hydrochar or biochar (as the case may be), such as soil manufacture, landspreading in forestry, energy crops, golf courses, turf grass or racing lands.

There is a possibility that exporting biosolids outside of Ireland could result in adverse effects on former European Sites³¹ in Northern Ireland, should the biosolids be exported there. However, it is noted that currently all biosolids in Northern Ireland are incinerated. Accordingly, any potential impacts associated with landspreading are unlikely. Furthermore, in Northern Ireland, Regulation 43 of the Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 (as amended) (“the Habitats Regulations”) transpose *inter alia* Articles 6(3) and 6(4) of Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora, and remain relevant following the UK’s departure from the EU. This approach is in line with the Conservation (Natural Habitats, etc.) Regulations (Amendment) (Northern Ireland) (EU Exit) Regulations 2019. Therefore, any potential adverse effects on the integrity of former European Sites arising from the reuse of exported material in Northern Ireland would be addressed through these pertinent legislative controls and is not considered further here.

Overall, it is considered that **adverse effects on the integrity of European Sites from the reuse of biosolids, biochar or hydrochar on non-agricultural land within Ireland are uncertain and therefore cannot be ruled out**. This is due to the potential losses of contaminants within biosolids, biochar or hydrochar into the environment where linkages to European sites exist. As noted above, it is acknowledged that biochar and hydrochar are likely to contain less contaminants than biosolids treated through conventional methods (possibly none). However, the final contaminant load will be influenced by the operating temperature of the process used to create the product. Accordingly, there is no certainty in the absence of detail regarding operating temperatures, whether biochar or hydrochar will contain contaminants. As described in **Section 5.4.2**, these contaminants may present a risk to protected habitats and species; the designated interests of European Sites. Furthermore, in some instances, there is uncertainty with regards to the sources of effect (e.g., presence or concentration of contaminants in biosolids, whether or not these could affect ecological receptors), the pathway to the receptor (i.e., transport within the ecosystem) and the effect at the receptor itself. Mitigation measures are required to address these potential adverse effects and uncertainty of these effects on the integrity of European Sites.

A summary of the potential effects arising as a result of technical strategies within the draft Strategy, and whether these effects trigger actual or potential adverse effects on the integrity of European Sites is set out in **Table 6-2**.

Table 6-2: Summary of Potential Effects Arising as a Result of Technical Strategies within the Draft Strategy, and Whether these Effects Trigger Actual or Potential Adverse Effects on the Integrity of European Sites.

Technical Strategy	Are actual or potential adverse effects on the integrity of European Sites triggered?	Rationale
Treatment		

³¹ Although not strictly required when considering Article 6(3), all the former European Sites within jurisdiction of Northern Ireland are also considered by this assessment despite these designations no longer forming part of the pan-European Natura 2000 network . This is considered prudent and practical, mindful of the potential trans-boundary impacts and effects of the draft Strategy on these former European Sites within Northern Ireland.

Pre-Consultation NIS

Technical Strategy	Are actual or potential adverse effects on the integrity of European Sites triggered?	Rationale
Provision of new infrastructure e.g. new sludge satellites or hub. Upgrade of existing infrastructure to provide additional capacity etc. Provision of new or upgraded treatment technologies (e.g. advanced anaerobic digestion, reed beds)	No	New facilities and infrastructure including upgrades will be subject to the usual planning development controls, licencing regime, and environmental assessment including Appropriate Assessment associated with all wastewater treatment facilities. Projects arising from the draft Strategy will be consistent with the protections afforded to European Sites under the Habitats Directive; including the provisions of Articles 6(3) and 6(4).
Transport		
Transport of sludge to designated satellites or hubs Transport of treated sludge to outlets for reuse.	No	Transport associated with sludge/biosolids management is regulated to ensure safe transportation of biosolids and/or sludge. UÉ optimise transport strategies through a Decision Support Tool. Furthermore, it is proposed in the draft Strategy to implement/consider nature-based solutions in projects (Action 2.1).
Reuse/Recycling		
Spreading of treated sludge on agricultural lands – nutrient losses to the environment	No	The landspreading of biosolids is regulated under the NAP and implementation of the GAP Regulations, as well as the Waste Management (Use of Sewage Sludge in Agriculture) Regulations 1998 as amended. Biosolids may only be spread on agricultural land in accordance with a NMP. The NAP and GAP Regulations are predominantly concerned with the protection of water from nutrients entering waterbodies through overland flow and leaching to groundwater, however, aerial emissions are addressed indirectly in the NAP and GAP Regulations, for example through restrictions on the ploughing of land and the use of Low Emission Slurry Spreading (LESS) equipment for landspreading. The NAP is subject to AA. Accordingly, adverse effects on the integrity of European Sites, arising from nutrient losses from the landspreading of biosolids, is assessed as part of the AA of the NAP and is not considered further here.
Spreading of treated sludge on agricultural lands – contaminant losses	Yes	The use of sewage sludge in agriculture is highly regulated in Ireland, with high levels of monitoring and control. UÉ operate within this regulatory framework. However, the regulations and guidelines require review to integrate new research, wider environmental legislation and policy, and knowledge. A recent risk assessment at EU level concluded that treated sludge spread onto lands could result in contamination of soils and/or waterbodies by organic compounds, metals and microplastics, and at least some of these contaminants could cause risks for the environment and human health (Huygens, et al., 2022). It is possible that different risk levels for contaminants may be present across Europe, depending on local characteristics and the nature of the sludge applied to land (EEA, 2024). The actual risk in an Irish context is not well understood, however research undertaken in Ireland has identified at least some concerns/potential risks to the environment (e.g., microplastics (Nash, et al., 2023; Mahon, et al., 2017) and priority metals that are not regulated in the Waste Management (Use of Sewage Sludge in Agriculture) Regulations 1998 and

Pre-Consultation NIS

Technical Strategy	Are actual or potential adverse effects on the integrity of European Sites triggered?	Rationale
		2001 (Healy, et al., 2017)). This uncertainty has led to the conclusion that there is <u>potential</u> for adverse effects on the integrity of European Sites.
Other reuse/recycling outlets – Project specific (e.g., landfill capping)	No	Project specific outlets (e.g., landfill capping) would be subject to strict planning procedures, Emission Limit Values (ELVs) set out in licences (where appropriate) or at the very least screening for AA. Accordingly, such projects arising from the draft Strategy in principle should not result in adverse effects on European Sites.
Other reuse/recycling outlets – e.g., reuse in soil manufacture, landspreading on lands for energy crops, silviculture, golf courses.	Yes	As these alternative outlets involve the landspreading or use of biosolids/biochar/hydrochar on non-agricultural land, they have the same potential effects on the integrity of European Sites as those that could arise from landspreading onto agricultural lands.
Other reuse/disposal outlets – Export	No	Regulation 43 of the Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 (as amended) ('the Habitats Regulations') transpose <i>inter alia</i> Articles 6(3) and 6(4) of Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora and remain relevant following the UK's departure from the EU. Therefore, any potential adverse effects on the integrity of former European Sites arising from the reuse of exported material in Northern Ireland would be addressed through these pertinent legislative controls and is not considered further here.

6.4.4.2 Actions

The actions associated with each strategic objective/aim are assessed in **Table 6-3** below.

Table 6-3: Assessment of Key Actions for Achieving the Draft Strategy.

Strategic Objective	Action	Assessments of Effects on Integrity of European Sites	Conclusion of Assessment of Effects on Integrity of European Sites	Mitigation required to address any actual or potential adverse effects on the integrity of European Sites?
1 - Sustainable management of wastewater sludge and bioresources	1.1 Implement Biogas Optimisation Programme and incorporate methane emissions monitoring and control into biogas producing sites.	The Biogas Optimisation Programme (BOP) is a Tier 3 programme, which has been initiated by UÉ. Its aim is to improve and optimise biogas production and usage, and to address common challenges across AD plants. It is conceivable that specific projects could come about as a result of this action. However, such projects will be subject to usual planning and licencing controls, including, where relevant, consideration of Article 6 of the EU Habitats Directive as it relates to Appropriate Assessment. Accordingly, projects arising from the draft Strategy will be consistent with the protections afforded to European Sites under the Habitats Directive; including the provisions of Articles 6(3) and 6(4).	No adverse effects on the integrity of European Sites.	None required
	1.2 Development of heat strategies and support heat recovery.	UÉ propose to develop energy and heat strategies and support heat recovery on-site. It is conceivable that specific activities or projects could come about as a result of this action. However, such projects will be subject to usual planning and licencing controls, including, where relevant, consideration of Article 6 of the EU Habitats Directive as it relates to Appropriate Assessment. Accordingly, projects arising from the draft Strategy will be consistent with the protections afforded to European Sites under the Habitats Directive; including the provisions of Articles 6(3) and 6(4).	No adverse effects on the integrity of European Sites.	None required
	1.3 Continue to develop potential opportunities for co-digestion in line with development of national policy or legislation.	Co-Digestion involves digesting wastewater sludge with other highly degradable organic wastes, as part of AD. It is conceivable that specific plans or projects could come about as a result of this action, (e.g., new AD facilities or upgrades of existing facilities). However, such projects will be subject to usual planning and licencing controls, including, where relevant, consideration of Article 6 of the EU Habitats Directive as it relates to Appropriate Assessment. Accordingly, projects arising from the draft Strategy will be consistent with the protections afforded to European Sites under the Habitats Directive; including the provisions of Articles 6(3) and 6(4).	No adverse effects on the integrity of European Sites.	None required

Pre-Consultation NIS

Strategic Objective	Action	Assessments of Effects on Integrity of European Sites	Conclusion of Assessment of Effects on Integrity of European Sites	Mitigation required to address any actual or potential adverse effects on the integrity of European Sites?
	1.4 Implement resource recovery technologies.	It is proposed that UÉ will continue to work with stakeholders and industry to implement resource recovery technologies. Examples of resources that can be recovered from wastewater sludge include biosolids, energy (electricity, heat), phosphorus, ammonia, biochar, hydrochar, biogas, biomethane and activated carbon. These resources can be recovered through various processes such as AD, AAD, ATC, incineration, HTC (hydrothermal carbonisation) or pyrolysis. It is conceivable that specific projects could come about as a result of this action (e.g., new AD facilities or upgrades of existing facilities). However, such projects will be subject to usual planning and licencing controls, including, where relevant, consideration of Article 6 of the EU Habitats Directive as it relates to Appropriate Assessment. Accordingly, projects arising from the draft Strategy will be consistent with the protections afforded to European Sites under the Habitats Directive; including the provisions of Articles 6(3) and 6(4).	No adverse effects on the integrity of European Sites.	None required
	1.5 Maximise circularity and valorisation of circular bioeconomy.	Valorisation of the circular bioeconomy relates to UÉs commitment to promoting a culture of public acceptance regarding circularity of bioresources. Valorisation of the circular bioeconomy in itself will not result in adverse effects on European Sites. However, maximising the circularity of the bioeconomy may require new infrastructure or upgrades of existing infrastructure. It is conceivable that specific projects could come about as a result of this action (e.g., new AD facilities or upgrades of existing facilities). However, such projects will be subject to usual planning and licencing controls, including, where relevant, consideration of Article 6 of the EU Habitats Directive as it relates to Appropriate Assessment. Accordingly, projects arising from the draft Strategy will be consistent with the protections afforded to European Sites under the Habitats Directive; including the provisions of Articles 6(3) and 6(4).	No adverse effects on the integrity of European Sites.	None required
	1.6 Increase understanding of alternative outlets, market demand and specification requirements for these outlets.	Increasing knowledge/understanding in itself will not result in adverse effects on European Sites. This is a neutral effect in this regard.	No adverse effects on the integrity of European Sites.	None required

Pre-Consultation NIS

Strategic Objective	Action	Assessments of Effects on Integrity of European Sites	Conclusion of Assessment of Effects on Integrity of European Sites	Mitigation required to address any actual or potential adverse effects on the integrity of European Sites?
	1.7 Carry out demonstration on advanced thermal conversion (ATC) technology, and based on outcome implement ATC technology.	No specific plans or projects are identified for such demonstrations in the draft Strategy; however, UÉ will progress a trial to demonstrate and test ATC to determine its suitability and technical and economic feasibility.. It is conceivable that specific projects could come about as a result of this action. However, such projects will be subject to usual planning and licencing controls, including, where relevant, consideration of Article 6 of the EU Habitats Directive as it relates to Appropriate Assessment. Accordingly, projects arising from the draft Strategy will be consistent with the protections afforded to European Sites under the Habitats Directive; including the provisions of Articles 6(3) and 6(4).	No adverse effects on the integrity of European Sites.	None required
	1.8 Continue to support current and future bioresources research projects, monitor specific evidence based findings and incorporate into risk assessment method.	Supporting research, undertaking monitoring and incorporation of same into risk assessment methods is a positive action that will not adversely affect any Europeans sites.	No adverse effects on the integrity of European Sites.	None required
	1.9 Invest in renewable energy optimisation and generation.	Whereas the investment in renewable energy does not trigger an adverse effect in itself, there is potential for adverse effects on European Sites if this action is linked with a plan or project. A BOP is proposed (see Action 1.1) as part of the draft Strategy. It is conceivable that specific plans or projects could come about as a result of this action. However, projects will be subject to usual planning and licencing controls, including, where relevant, consideration of Article 6 of the EU Habitats Directive as it relates to Appropriate Assessment. Accordingly, projects arising from the draft Strategy will be consistent with the protections afforded to European Sites under the Habitats Directive; including the provisions of Articles 6(3) and 6(4).	No adverse effects on the integrity of European Sites.	None required
	1.10 Quantify long term investment needs for our bioresource assets.	This action is considered neutral with respect to European Sites, since it relates to quantifying investment needs. This action in itself will not lead to development or other change, and no adverse effects on the integrity European Sites have been identified.	No adverse effects on the integrity of European Sites.	None required

Pre-Consultation NIS

Strategic Objective	Action	Assessments of Effects on Integrity of European Sites	Conclusion of Assessment of Effects on Integrity of European Sites	Mitigation required to address any actual or potential adverse effects on the integrity of European Sites?
2 - Protect and restore our environment	2.1 Implement nature-based solutions such as sludge reed beds (SRBs) on smaller sites (<2K P.E.) and SRBs are considered on all capital projects.	This action is generally positive. However, development of such solutions could conceivably have an adverse effect on a European Site. Specific projects are not identified within the draft Strategy. However, any projects that emerge from this action could have adverse effects on European Sites as a result indirect effects or even direct effects (e.g., through habitat loss, if the NBS results in the inadvertent loss of other more valuable habitat). However, projects will be subject to usual planning and licencing controls, including, where relevant, consideration of Article 6 of the EU Habitats Directive as it relates to Appropriate Assessment. Accordingly, projects arising from the draft Strategy will be consistent with the protections afforded to European Sites under the Habitats Directive; including the provisions of Articles 6(3) and 6(4).	No adverse effects on the integrity of European Sites.	None required
	2.2 Manage our assets to ensure biodiversity 'net gain'.	UÉ has developed a Biodiversity Action Plan (BAP) to ensure biodiversity is an integral factor in decision making processes across the business. This action will not lead to adverse effects on European Sites and is a positive action; including with respect to European Sites.	No adverse effects on the integrity of European Sites.	None required
	2.3 Implement actions from our 'Biodiversity Action Plan' in delivery of bioresources projects.	UÉ has developed a BAP to ensure biodiversity is an integral factor in decision making processes across the business. A relevant action within the BAP is that UÉ “will, wherever feasible, advocate the use of integrated constructed wetlands (ICWs), reed beds and other nature-based solutions as wastewater treatment solutions.” This action will not lead to adverse effects on European Sites. Any projects that include nature-based solutions will be subject to the usual planning and licencing controls, including, where relevant, consideration of Article 6 of the EU Habitats Directive as it relates to Appropriate Assessment.	No adverse effects on the integrity of European Sites.	None required
	2.4 Mangle wastewater sludge and bioresources throughout the asset lifecycle to meet our existing regulatory requirements.	This action commits to complying with existing regulatory requirements in the management of wastewater sludge. The key regulatory and policy framework includes the Sewage Sludge Directive, the Nitrates Directive, the Waste Framework Directive, the Industrial Emissions Directive, the rUWWTD and the Code of Good Practice for the use of Biosolids in Agriculture. The outcomes	No adverse effects on the integrity of European Sites.	None required

Pre-Consultation NIS

Strategic Objective	Action	Assessments of Effects on Integrity of European Sites	Conclusion of Assessment of Effects on Integrity of European Sites	Mitigation required to address any actual or potential adverse effects on the integrity of European Sites?
		<p>of this action may result in new projects or upgrades (e.g., upgrades to an existing WWTP to ensure compliance with relevant regulations). However, projects will be subject to usual planning and licencing controls, including, where relevant, consideration of Article 6 of the EU Habitats Directive as it relates to Appropriate Assessment. Accordingly, projects arising from the draft Strategy will be consistent with the protections afforded to European Sites under the Habitats Directive; including the provisions of Articles 6(3) and 6(4).</p>		
	<p>2.5 Ensure all new regulatory requirements of the rUWWTD are met e.g. enhanced monitoring, energy neutrality, and circular economy.</p>	<p>The draft Strategy notes that the rUWWTD was adopted in November 2024 and UÉ will ensure that all new UWWTD requirements are met. These requirements include enhanced monitoring, energy neutrality, and circular economy. There is some uncertainty with regards to whether any new plans or projects will arise as a result of this action to ensure compliance with the rUWWTD. It is assumed for the purposes of assessment that the outcomes of this action may result in new plans or projects which could conceivably result in adverse effects on European Sites. However, projects will be subject to usual planning and licencing controls, including, where relevant, consideration of Article 6 of the EU Habitats Directive as it relates to Appropriate Assessment. Accordingly, projects arising from the draft Strategy will be consistent with the protections afforded to European Sites under the Habitats Directive; including the provisions of Articles 6(3) and 6(4).</p>	<p>No adverse effects on the integrity of European Sites.</p>	<p>None required</p>
	<p>2.6 We are engaging with regulators and stakeholders regarding the development of a revised Code of Good Practice for the Use of Biosolids in Agriculture.</p>	<p>The draft Strategy notes, in relation to the Code of Good Practice for the Use of Biosolids in Agriculture, that a multi stakeholder working group including UÉ was set up in 2024 to review and update the Code to consider developments in monitoring requirements and technologies.</p> <p>The development of a revised Code of Practice will be a positive measure. Accordingly, adverse effects from this action are not predicted since any revised code would need to be consistent with the EU Habitats Directive both with respect to the measures</p>	<p>No adverse effects on the integrity of European Sites</p>	<p>None required</p>

Pre-Consultation NIS

Strategic Objective	Action	Assessments of Effects on Integrity of European Sites	Conclusion of Assessment of Effects on Integrity of European Sites	Mitigation required to address any actual or potential adverse effects on the integrity of European Sites?
		identified within the Code and their subsequent application and implementation.		
	2.7 Implement national emerging contaminants monitoring programme and carry out additional analysis as needs emerge.	Monitoring and analysis of emerging contaminants in biosolids will be important for building up the knowledge base with regards to the risk emerging contaminants present to the environment. Undertaking monitoring/analysis on emerging contaminants is an information gathering exercise and will in itself will not result in adverse effects on European Sites.	No adverse effects on the integrity of European Sites	None required
	2.8 Continue on-going regulatory monitoring and UÉ traceability data collection.	Following on from the adoption of the NWSMP, an online reporting traceability system was implemented. This system ensures there is consistency and traceability in reporting of sludge reuse through the use of GIS systems. Continuation of ongoing regulatory monitoring and the aforementioned traceability system is an information gathering exercise and will in itself will not result in adverse effects on European Sites.	No adverse effects on the integrity of European Sites.	None required
	2.9 Implement a National Biosolids Assurance Scheme.	The key aim of a Biosolids Assurance Scheme (BAS) would be, amongst other things, to provide stakeholder reassurance and increase the acceptability of biosolids recycling to agricultural land. The BAS would be independently audited. The principal objectives of the BAS would be to ensure that all relevant regulatory requirements, codes and best practice are transparently included in the BAS Standard and provide stakeholder reassurance on food safety and the protection of the environment. The BAS Standard will enable full transparency and encompass all key aspects required of a quality assurance system covering regulatory requirements, treatment, monitoring, recording, reporting and SOPs implementation. This action is positive and will not result in adverse effects on European Sites.	No adverse effects on the integrity of European Sites.	None required
	2.10 Engage with key stakeholders and consult on PFAS limits.	Per- and poly-fluoroalkylated substances (PFAS) are contaminants of concern that can occur in wastewater sludge. Engaging and consulting with key stakeholders on PFAS limits itself does not result in adverse effects on European Sites and is overall a positive action.	No adverse effects on the integrity of European Sites	None required

Pre-Consultation NIS

Strategic Objective	Action	Assessments of Effects on Integrity of European Sites	Conclusion of Assessment of Effects on Integrity of European Sites	Mitigation required to address any actual or potential adverse effects on the integrity of European Sites?
	2.11 Implement alternative uses if needed.	<p>UE will implement alternative uses if there is a risk to available land bank. It is conceivable that alternative uses of biosolids/wastewater sludge could result in adverse effects on the integrity of European Sites. Alternative uses include ATC technologies, reuse in industry, reuse on non-agricultural land, or export (UE note that export will only be considered as a short-term emergency option if all other outlet options are exhausted). The outcomes of this action may result in new plans or projects which could conceivably result in adverse effects on the integrity of European Sites (e.g., ATC, re-use in industry). However, projects and plans will be subject to usual planning and licencing controls, including, where relevant, consideration of Article 6 of the EU Habitats Directive as it relates to Appropriate Assessment. Accordingly, projects or plans arising from the draft Strategy will be consistent with the protections afforded to European Sites under the Habitats Directive; including the provisions of Articles 6(3) and 6(4).</p> <p>Alternative uses that are not project specific (e.g., re-use in non-agricultural land options) have the potential to result in adverse effects on the integrity of European Sites. Similar effects on European Sites could arise from the landspreading or use of biosolids on non-agricultural land, as those that could arise from landspreading onto agricultural lands (e.g., emerging contaminant or heavy metal losses).</p> <p>Should wastewater sludge/biosolids be exported outside of Ireland (namely Northern Ireland), this could also result in adverse effects on the integrity of former European Sites in Northern Ireland. As noted previously, Regulation 43 of the Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 (as amended) ('the Habitats Regulations') transpose <i>inter alia</i> Articles 6(3) and 6(4) of Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora and remain relevant following the UK's departure from the EU. Therefore, any potential adverse effects on the integrity of former European Sites arising from the reuse of exported material in Northern Ireland would be addressed through these pertinent legislative controls and is not considered further here.</p>	Potential for adverse effects on the integrity of European Sites	See Section 7

Pre-Consultation NIS

Strategic Objective	Action	Assessments of Effects on Integrity of European Sites	Conclusion of Assessment of Effects on Integrity of European Sites	Mitigation required to address any actual or potential adverse effects on the integrity of European Sites?
	<p>2.12 Bioresources response plan to be reviewed and developed to manage land outlet.</p>	<p>UÉ propose to develop a response plan to manage the land outlet. According to the draft Strategy, UÉ will implement alternative treatment and reuse options if there is a risk to land bank availability. As noted for Action 2.11, the implementation of alternative uses if there is risk to land bank could result in adverse effects on the integrity of European Sites.</p>	<p>Potential for adverse effects on the integrity of European Sites</p>	<p>See Section 7</p>
	<p>2.13 Promote source control management, advocating legislation around source control and improving wastewater sludge quality.</p>	<p>UÉ consider source control a preferable management option to end-of-pipe treatment to minimise the risk of specific contaminants of concern in treated biosolids. Promoting the control of pollutants at source is a positive measure that will not result in adverse effects on European Sites and may remove or reduce potential sources of adverse effects. Promoting control at source is included in both the rDWD and the rUWWTD.</p>	<p>No adverse effects on the integrity of European Sites</p>	<p>None required</p>
	<p>2.14 Carry out risk assessments for industrial / pharmaceutical effluent discharging into our wastewater treatment plants.</p>	<p>Undertaking risk assessments for industrial / pharmaceutical effluent discharging into UÉ wastewater treatment plants is a positive measure that will not result in adverse effects on the integrity of European Sites.</p>	<p>No adverse effects on the integrity of European Sites</p>	<p>None required</p>
	<p>2.15 Provide storage facilities for treated bioresources nationally.</p>	<p>Storage facilities are required to facilitate the predicted increase in sludge as new and upgraded plants are completed. Storage is particularly important for periods when landspreading of biosolids is not permitted. It is proposed to use the Decision Support Tool (DST) model to identify strategic storage locations nationally, and these may be located at the regional Bioresource Centres (BCs) or at a separate storage facility. Projects stemming from this action (e.g. the development of storage facilities) could conceivably affect European Sites. However, projects will be subject to usual planning and licencing controls, including, where relevant, consideration of Article 6 of the EU Habitats Directive as it relates to Appropriate Assessment. Accordingly, projects arising from the draft Strategy will be consistent with the protections afforded to European Sites under the Habitats Directive; including the provisions of Articles 6(3) and 6(4).</p>	<p>No adverse effects on the integrity of European Sites</p>	<p>None required</p>

Pre-Consultation NIS

Strategic Objective	Action	Assessments of Effects on Integrity of European Sites	Conclusion of Assessment of Effects on Integrity of European Sites	Mitigation required to address any actual or potential adverse effects on the integrity of European Sites?
3 - Support our communities, growth and the bioeconomy	3.1 Develop a culture of acceptance and community education & awareness regarding quality assurance and circularity of bioresources.	This action relates to UÉ's commitment to promoting education and a culture of public acceptance regarding circularity of bioresources. This action in itself is neutral and will not result in adverse effects on European Sites.	No adverse effects on the integrity of European Sites	None required
	3.2 Engage with EU, regulators and key stakeholders regarding the development of the proposed new EU Circular Economy Act.	This action relates to UÉ's commitment to engage with regulators and key stakeholders regarding the development of the proposed new EU Circular Economy Act. The purpose of the proposed new Circular Economy Act is to help creating market demand for secondary materials and a single market for waste, notably in relation to critical raw materials. This action in itself is neutral and will not result in adverse effects on European Sites.	No adverse effects on the integrity of European Sites	None required
	3.3 Embed growth and demand analysis capability to forecast and plan for future investment requirements.	UÉ embed growth analysis capacity to forecast and plan future investment requirements. Forecasting and planning future investment requirements, and the use of tools (i.e., growth and demand analysis) to achieve same, will in itself not result in adverse effects on European Sites.	No adverse effects on the integrity of European Sites	None required
	3.4 Engage and collaborate with key stakeholders to support local, regional and national planning policy.	There is potential for adverse effects on European Sites if support stemming from this action is linked with a plan or project. Any plans or projects that arise from this action could have adverse effects on European Sites. However, projects and plans will be subject to usual planning and licencing controls, including, where relevant, consideration of Article 6 of the EU Habitats Directive as it relates to Appropriate Assessment. Accordingly, projects or plans arising from the draft Strategy will be consistent with the protections afforded to European Sites under the Habitats Directive; including the provisions of Articles 6(3) and 6(4).	No adverse effects on the integrity of European Sites	None required
4 - Efficient operation of wastewater sludge and bioresources centres	4.1 Phase out leachate acceptance at our wastewater treatment plants in consultation with Regulators, Local Authorities and waste operators.	To reduce risk of leachate contaminating treated biosolids and bioresources, it is planned to phase out accepting leachate at UÉ WWTPs in the coming years, where appropriate. This is a positive measure in that it will serve to reduce the risk to European Sites (i.e., by reducing risk of losses of contaminants that may be in treated biosolids as a result of leachate, to the environment). This	No adverse effects on the integrity of European Sites	None required

Pre-Consultation NIS

Strategic Objective	Action	Assessments of Effects on Integrity of European Sites	Conclusion of Assessment of Effects on Integrity of European Sites	Mitigation required to address any actual or potential adverse effects on the integrity of European Sites?
		action is to be carried out over a period of years, thereby giving stakeholders time to find alternative disposal outlets for leachate.		
	4.2 Continue to utilise licenced waste transport operators and auditing of contractors to ensure compliance with Standard Operating Procedure (SOP).	This action commits UÉ to continue to use licenced waste transport operators and undertake auditing. It is noted in the draft Strategy that the need for sustainable transportation is identified in the Water Services Strategic Plan (WSSP) which states that 'transport and reuse of all wastewater sludge will be managed to ensure compliance with our standards by registered contractors with full traceability.' According to the draft Strategy, UÉ Sludge Framework Contractors carry out all elements of the works related to the transportation of sludge in accordance with current legislation, regulations and the requirements set out within the Code of Good Practice for the Use of Biosolids in Agriculture. These measures are detailed in Section 5.2.2 . Given that the transportation of sludge will be undertaken in accordance with current legislation, regulations and the requirements set out within the code, and auditing will assess whether SOPs are being adhered to and ensure compliance, this action is not predicted to result in adverse effects on European Sites.	No adverse effects on the integrity of European Sites.	None required.
	4.3 Review dry solids monitoring on all new and upgraded wastewater sludge treatment assets to improve dewatering quality.	UÉ will review and incorporate dry solids monitoring to improve quality and to ensure optimal operations. This action in itself will not result in adverse effects on European Sites.	No adverse effects on the integrity of European Sites.	None required.
	4.4 Review and update Standard Operating Procedures (SOPs) for wastewater sludge and bioresources treatment assets.	SOPs have been developed by UÉ to ensure that the wastewater sludge and bioresource treatment and reuse process is controlled and monitored. The SOPs ensure consistency in operation. Reviewing and updating SOPs for wastewater sludge and bioresources treatment assets is in itself a neutral effect and will not result in adverse effects on European Sites.	No adverse effects on the integrity of European Sites.	None required.
	4.5 Continue to develop a National Bioresource Decision Support Tool, optimising low carbon transport.	The National Bioresources Strategic Decision Support tool (DST) will enable UÉ to evaluate and make informed decisions on the national bioresources assets in Ireland. In terms of implications for European Sites, this action in itself is neutral and will not result in adverse effects on European Sites.	No adverse effects on the integrity of European Sites.	None required.

Pre-Consultation NIS

Strategic Objective	Action	Assessments of Effects on Integrity of European Sites	Conclusion of Assessment of Effects on Integrity of European Sites	Mitigation required to address any actual or potential adverse effects on the integrity of European Sites?
	<p>4.6 Implement sustainable efficient pre treatment drying technology in parallel with ATC to optimise resource recovery.</p>	<p>It is proposed that UÉ will continue to work with stakeholders and industry to implement resource recovery technologies. This action specifically relates to the implementation of efficient thermal drying technology in parallel with ATC. Thermal drying is undertaken by direct or indirect application of an external heat source to dewatered sludge to evaporate water from the sludge. Thermal drying produces a fully pasteurised granular product with a dry solids content greater than 90%. The main advantages of this process are the significant volume reduction of sludge and the potential for alternative outlets to land-spreading. Any projects that emerge from this action could conceivably have adverse effects on European Sites. However, projects will be subject to usual planning and licencing controls, including, where relevant, consideration of Article 6 of the EU Habitats Directive as it relates to Appropriate Assessment. Accordingly, projects arising from the draft Strategy will be consistent with the protections afforded to European Sites under the Habitats Directive; including the provisions of Articles 6(3) and 6(4).</p>	<p>No adverse effects on the integrity of European Sites.</p>	<p>None required.</p>

6.5 Assessment of In-Combination Effects

The assessment of potential in-combination effects of the draft Strategy with respect to other relevant plans or projects has been completed with reference to EC guidance (EC, 2021a). With reference to Section 4.2 of that guidance, a proportionate approach has been taken with respect to the in-combination assessment. This approach has been mindful that the draft Strategy is a national plan which sets out actions and strategies that are commensurate with the level of detail included within such a plan. It recognises that it provides a framework for planning but where the detail of plans and projects which will come forward as a result of the framework will only be developed following the adoption of the draft Strategy. In line with EC guidance, a stepwise approach has been taken to consideration of in-combination effects as follows:

- Identify plans / projects that might act in-combination;
- Identify the types of impact that might occur;
- Define boundaries of the assessment;
- Identify pathways for impact; and
- Impact prediction and assessment.

The assessed plans are provided in **Table 6-4**. Overall, adverse in-combination effects with other plans are not predicted.

Table 6-4: Assessment of In-Combination Effects

Draft Strategy in Combination with...	Assessment of Effects
European and International Plans/Policy	
<p>Eighth Environmental Action Programme (2021-2030)</p> <p>The 8th EAP aims to accelerate the transition to a climate-neutral, resource-efficient and regenerative economy. It recognises that human wellbeing and prosperity depend on the healthy ecosystems within which we operate and sets out six priority objectives (i) climate neutrality by 2050 (ii) reducing vulnerability to climate change (iii) circular economy (iv) zero-pollution ambition (v) enhancing natural capital and (vi) reducing environmental and climate pressures.</p>	<p>As the EAP is aimed at environmental protection. Adverse in-combination effects are not predicted.</p>
<p>The EU Biodiversity Strategy to 2030</p> <p>The new Biodiversity Strategy to 2030 aims to put Europe's biodiversity on the path to recovery by 2030 for the benefit of people, climate and the planet. In the context of the post-COVID-19 pandemic, it aims to build resilience to future threats, including climate change, security of food supplies, forest fires, outbreaks of disease and combating the illegal trade in wildlife. It aims to increase the Natura 2000 network and will launch an EU restoration plan by the end of 2021. To enable implementation, it also aims to allow better tracking of progress, improving knowledge transfer and emphasising 'respect for nature' in public and business decision-making.</p>	<p>There is no potential for in-combination effects arising from this strategy as the primary purpose of the EU Biodiversity Strategy is to halt the loss of habitat and species. Climate change, identified as a key threat to biodiversity, and transition to renewable energy resources will, in part, respond to climate change and its impacts and effects.</p>
<p>EU Nature Restoration Law</p> <p>The Nature Restoration Law is the first continent-wide, comprehensive law of its kind. It is a key element of the EU Biodiversity Strategy, which sets binding targets to restore degraded ecosystems, in particular those with the most potential to capture and store carbon and to prevent and reduce the impact of natural disasters. The law aims to restore ecosystems, habitats and species across the EU's land and sea areas in order to:</p> <ul style="list-style-type: none"> • enable the long-term and sustained recovery of biodiverse and resilient nature; • contribute to achieving the EU's climate mitigation and climate adaptation objectives; and • meet international commitments. 	<p>Adverse in-combination effects are not predicted as the primary purpose of the EU Nature Restoration Law is to restore habitats and species.</p>
<p>EU Green Deal 2050</p> <p>In response to the challenges facing Europe, the European Green Deal was adopted for the EU in December 2019. Termed a new growth strategy based on clean products and technologies, the European Green Deal is committed to working towards a climate-neutral society by 2050. It has an action plan/ roadmap of actions, of which the key objectives are to: increase the efficient use of resources by moving to a clean, circular economy; as well</p>	<p>The EU Green Deal is an overarching strategy to achieve climate neutrality by 2050. It coordinates actions across key sectors including agriculture, energy, biodiversity, climate and transport. It operates across nine policy areas, three of the key areas of relevance being biodiversity, elimination of pollution and climate change. Various actions have been assigned including the development of the EU Biodiversity Strategy to 2030 and development of a Zero Pollution Action Plan. In this regard, the main thrust of the Green</p>

Pre-Consultation NIS

Draft Strategy in Combination with...	Assessment of Effects
<p>as to restore biodiversity and cut pollution. It also aims to support innovation of industry to increase circularity.</p>	<p>Deal is positive and would not be expected to result in an in-combination effect with the draft Strategy.</p>
<p>EU Water Framework Directive (2000/60/EC) (as amended) and Third Cycle River Basin Management 2022-2027 – The Water Action Plan 2024</p> <p>The primary purpose of this Directive and the River Basin Management Plans (RBMP) implemented as part of same, is to achieve good status for all water bodies, with no deterioration in water body status. The RBMP sets out the Programme of Measures (PoM) to achieve the objectives of the WFD; measures that are necessary to protect and restore water quality in Ireland. The overall approach of the Third Cycle will be “the right measure, in the right place”.</p>	<p>The Water Action Plan 2024 has been subject to Appropriate Assessment and informed by a Natura Impact Statement. The primary purpose of this Directive and the River Basin Management Plans (RBMP) implemented as part of same, is to achieve good status for all water bodies, with no deterioration in water body status. Adverse in-combination effects are not predicted.</p>
<p>EU National Emissions Ceiling (NEC) Directive</p> <p>Directive (EU) 2016/2284 (replacing 2001/81/EC) ‘on the reduction of national emissions of certain atmospheric pollutants’ sets national emission reduction commitments for Member States and the EU for five important air pollutants: nitrogen oxides, non-methane volatile organic compounds, sulphur dioxide, ammonia and fine particulate matter. The new NEC Directive, which entered into force in December 2016, sets 2020 and 2030 emission reduction commitments for five main air pollutants.</p>	<p>Ireland’s national emission reduction commitment for ammonia (NH3) for 2020 under the NECD was a 1 per cent reduction compared to a 2005 baseline level. As emissions in 2020, 2021 and 2022 were 3.2, 4.2 and 3.0 per cent higher, respectively, than in 2005, Ireland is non-compliant with the emission reduction commitment for 2020 to 2029. Achievement of the 2030 Emission Reduction Commitment for NH3 is projected under the “With Additional Measures” scenario but not the “With Existing Measures” scenario. These measures are outlined in the Teagasc NH3 Marginal Abatement Cost Curve (MACC) and the DAFM AgClimatise documents and the revised National Air Pollution Control Programme. The main thrust of the Directive is positive. Adverse in-combination effects are not predicted</p>
<p>REPowerEU Plan</p> <p>This plan is focused on rapidly reducing the European Union’s reliance on Russian fossil fuels by progressing the clean energy transition and fostering increased collaboration throughout and across Member States to create a more resilient European energy system. REPowerEU expands the ‘Fit for 55’ proposals by setting out additional actions to save energy by reducing demand and consumption, diversify energy sources and supplies, accelerate fossil fuel substitution, and improve investment frameworks facilitating reforms, faster permitting, and innovation.</p>	<p>The REPowerEU Plan supports the reduction of the EU’s reliance of Russian fossil fuels by progressing the clean-energy transition and, as such, the main thrust of the Plan is positive as it addresses climate-change aspects. Of relevance to the draft Strategy, is that the plan proposes to increase the production of biomethane. Projects arising from the plan will be subject to SEA and AA processes. Therefore, there is no potential for in-combination effects.</p>
<p>Paris Agreement (COP21) (adopted 2015)</p> <p>The Paris Agreement (COP21) has an overarching goal to hold “the increase in the global average temperature to well below 2°C above pre-industrial levels” and pursue efforts “to limit the temperature increase to 1.5°C above pre-industrial levels”. The Paris Agreement requires economic and social transformation based on best available science to limit global warming. To achieve this goal, signatories of the Paris Agreement are required to set goals and targets in line with the increasingly ambitious climate action stipulated in the Agreement.</p>	<p>The Paris Agreement is the overarching policy which encourages the development and submission of each nation’s Climate Action Plan. As such, there is no potential for in-combination effects with this policy, though the Paris Agreement does help to guide these nationally determined contributions.</p>

Pre-Consultation NIS

Draft Strategy in Combination with...	Assessment of Effects
<p>Common Agricultural Policy (CAP) and CAP Strategic Plan (CSP) 2023-2027</p> <p>The aim of the Common Agricultural Policy (CAP) is to protect family farm incomes, support the rural economy, ensure the production of high-quality safe food for consumers, and protect rural landscapes and the environment. Ireland’s CAP Strategic Plan 2023-2027 has a strong emphasis on achievement of a higher level of climate and environment ambition.</p>	<p>While the emphasis on achievement of a higher level of climate and environment ambition within CAP may have positive environmental effects, it remains unclear how this will translate on the ground as ambitions also include increased competitiveness. Agriculture is a significant pressure for many waterbodies and European sites in Ireland, largely due to losses of excess nutrients to waterbodies. The landspreading of all fertilisers (including biosolids) are regulated in Ireland through the NAP and GAP Regulations. The NAP has been subject to AA. Furthermore, biosolids may only be spread on agricultural land in accordance with a NMP as set out in the Waste Management (Use of Sewage Sludge in Agriculture) Regulations 1998 as amended. The NMP manages the application rates of nutrients and determines the maximum permissible rate of application of nutrients at a local level. This in turn reduces the risk of the application of excess nutrients and therefore leaching/run-off to waterbodies. Taking this into account, adverse in-combination effects are not predicted.</p>
<p>Nutrients Action Programme (NAP) 2019-2022 for Northern Ireland</p> <p>These Regulations are set out by the Department of Agriculture, Environment and Rural Affairs. The Regulations give further effect to Nitrates Directive 91/676/EEC concerning the protection of waters against pollution caused by nutrients from agricultural sources. Public consultation on the proposed Nutrients Action Programme for 2026 – 2029 was held in mid-2025.</p>	<p>The Nutrients Action Programme Implementation Report for 2020-2023 found that in recent years there has been an increase in the number of sites showing increasing levels of nitrate in freshwaters. 2021 WFD data shows 49% of river water bodies in NI were classed as Moderate/Poor status (indicative of eutrophic conditions). There is spatial overlap of river basin districts between the Republic of Ireland and Northern Ireland (e.g. the North Western and Neagh Bann). The landspreading of all fertilisers (including biosolids) are regulated in the Republic of Ireland through the NAP and GAP Regulations. The NAP has been subject to AA. Furthermore, biosolids may only be spread on agricultural land in accordance with a NMP as set out in the Waste Management (Use of Sewage Sludge in Agriculture) Regulations 1998 as amended. The NMP manages the application rates of nutrients and determines the maximum permissible rate of application of nutrients at a local level. This in turn reduces the risk of the application of excess nutrients and therefore leaching/run-off to waterbodies. Taking this into account, adverse in-combination effects are not predicted.</p>
<p>National Plans/Policy</p>	
<p>National Development Plan 2021-2030</p> <p>The National Development Plan sets out the investment priorities that will underpin the implementation of the National Planning Framework (NPF). This will guide national, regional, and local planning and investment decisions in Ireland over the next two decades, to cater for an expected population increase of over one million people between 2016 to 2040.</p>	<p>The NDP is a high-level budgetary and finance document which identifies priorities for capital investment. Given the nature of the capital investment, the majority of the projects referenced and funded under the NDP have been or will be subject to EIA/AA. The NDP does not confer planning, it identifies strategic need. There is no potential for in-combination effects.</p>
<p>National Planning Framework</p> <p>The NPF is the overarching policy and planning framework for the social, economic and cultural development of Ireland. The NPF has been recently revised, with the revision approved in April 2025. The framework has been revised and updated to take account of changes that have occurred since it was published in 2018 and to build on the framework</p>	<p>The revised NPF has strong policy objectives for the protection of biodiversity and European Sites. Of relevance are NPO1 and NPO85. NPO1 ensures that all plans, projects and activities requiring consent arising from the National Planning Framework are subject to the relevant environmental assessment requirements including SEA, EIA, SFRA and AA, as appropriate. NOP85 states that in line with the National Biodiversity</p>

Pre-Consultation NIS

Draft Strategy in Combination with...

that was in place. It is a framework to guide public and private investment, to create and promote opportunities for Ireland's people, and to protect and enhance the environment.

Assessment of Effects

Action Plan; the conservation, enhancement, mitigation and restoration of biodiversity is to be supported by:

- Integrating policies and objectives for the protection and restoration of biodiversity, including the principles of the mitigation hierarchy of - avoid, minimise, restore and offset - of potential biodiversity impacts, in statutory land use plan.
- Retention of existing habitats which are currently important for maintaining biodiversity (at local/regional/national/international levels), in the first instance, is preferable to replacement/restoration of habitats, in the interests of ensuring continuity of habitat provision and reduction of associated risks and costs.

The NPF has been subject to AA and includes clear policy on avoidance of impacts to European sites. There is no potential for in-combination effects.

Regional Spatial and Economic Strategies (2020)

The three regional strategies seek to interpret and implement the NPF at a regional level.

The three regional strategies include clear policy and supporting actions to avoid and minimise impacts on European Sites. They include similar commitments to only implement the policy base within the carrying capacity of the receiving environment as greater detail is known through the planning hierarchy. There is no potential for in-combination effects

Ireland's Second National Implementation Plan for the Sustainable Development Goals (SDG) 2022-2024

This plan was established in collaboration with the Government Department and key stakeholders. The plan sets 51 actions which contain 119 measures with the focus to improve Ireland's implementation structure to successfully achieve the SDGs. Moreover, this implementation plan outlines five strategic objectives including the following:

- Strategic Objective 1: To embed the SDG framework into the work of Government Departments to achieve greater Policy Coherence for Sustainable Development
- Strategic Objective 2: To integrate the SDGs into Local Authority work to better support the localisation of the SDGs
- Strategic Objective 3: Greater partnerships for the Goals
- Strategic Objective 4: To further incorporate the principle of Leave No One Behind into Ireland's Agenda 2030 implementation and reporting mechanisms
- Strategic Objective 5: Strong reporting mechanisms

The SDGs are aimed at sustainable development, and environmental protection is a core element of this. The actions within the implementation plan typically relate to embedding the SDGs into government activities and policy and promoting awareness (e.g., Review of Interdepartmental Working Group practices; Local Authority SDG training; consider the potential to integrate the SDGs into the budgetary process; Development of a Local Authority SDG toolkit; Improve stakeholder communications and engagement; Raise the profile and understanding of the SDGs across public libraries). Adverse in-combination effects are not predicted.

Climate Action Plan 2025 (CAP25)

This plan is the third to be prepared under the Climate Action and Low Carbon Development (Amendment) Act 2021. The Plan lays out a roadmap of actions which will ultimately lead us to meeting our national climate objective of pursuing and achieving, by no later than the end of the year 2050, the transition to a climate resilient, biodiversity rich, environmentally sustainable and climate neutral economy. It aligns with the legally binding

CAP25 was subject to AA. The main thrust of CAP25 is positive, and there is potential for positive in-combination effects as it supports long-term resilience to climate change.

Pre-Consultation NIS

Draft Strategy in Combination with...

economy-wide carbon budgets and sectoral emissions ceilings that were agreed by Government in July 2022.

Assessment of Effects**National Biomethane Strategy**

The strategy sets out an objective of achieving 5.7 TWh of indigenous biomethane production by 2030, drawing on the development of a national anaerobic digestion industry along with increased agricultural diversification. It is estimated that the achievement of this target will offset a little over 10% of current usage of fossil gas and will rise to over 50% of our usage by the mid-2030s as we shift our economy further away from gas in favour of electrification. The National Biomethane Strategy will be agri-led and farmer-centric with a focus on the supply of suitable feedstocks, including animal slurries.

The National Biomethane Strategy notes that sewage sludge is a potential non-agriculture feedstock for AD that is currently generating biogas in Ireland that could be utilised to generate biomethane while also processing the sludge. Notably, the draft Strategy aims to implement a Biogas Optimisation Programme and incorporate methane emissions monitoring and control into biogas producing sites. Whereas AD infrastructure can have environmental effects, and potential significant effects on European Sites, all AD developments are required to undergo a planning process to ensure proper consideration of a range of factors, including location, visual impact, land-zoning plans, and ecology. Of relevance also is that the National Biomethane Strategy includes a measure to develop guidelines to support local authorities when assessing AD and biorefinery planning applications, and to develop a Biomethane Sustainability Charter to support the delivery of environmentally sustainable biomethane in Ireland. The main thrust of National Biomethane Strategy is positive, and there is potential for positive in-combination effects as it supports long-term resilience to climate change.

Bioeconomy Action Plan 2023-2025

The plan sets out an approach to using the wastes and side-streams from various sectors, such as agriculture, forestry, fisheries, and aquaculture. The aims are to support a circular and regenerative bioeconomy. Such a system has the potential to reduce GHG emissions and create new opportunities and diversification activities and the potential to replace fossil-fuel based resources with bio-based ones, such as the creation of bioenergy, biofertilisers, biopackaging, etc.

The plan sets out a number of actions related to education, developing initiatives/strategies, seeking funding, identifying markets/pathways, offering supports and developing opportunities related to bio-based products and services, and identifying training needs/skills. There is potential for positive in-combination effects as circular economy principles are in line with that supported by the draft Strategy.

Catchment-based Flood Risk Assessment and Management (CFRAM) Programme, under the EU Floods Directive

The Office of Public Works (OPW) is responsible for the implementation of the Floods Directive 2007/60/EC (as amended) which is being carried out through a Catchment based-Flood Risk Assessment and Management (CFRAM) Programme. As part of the directive Ireland is required to undertake a Preliminary Flood Risk Assessment, to identify areas of existing or potentially significant future flood risk and to prepare flood hazard and risk maps for these areas. Following this, Flood Risk Management Plans (FRMPs) are developed for these areas setting objectives for managing the flood risk and setting out a prioritised set of measures to achieve the objectives. The CFRAM programme is currently being rolled out and Draft Flood Risk Management Plans have been prepared. These plans have been subject AA.

CFRAM studies and their product Flood Risk Management Plans, have undergone appropriate assessment. Any future flood plans will have to take into account the design and implementation of water management infrastructure as it has the potential to impact on hydromorphology and potentially on the ecological status and favourable conservation status of water bodies. Reduction in urban flooding, particularly in areas with combined sewerage infrastructure, could result in reductions in contaminants entering WWTPs through storm run-off. Adverse in-combination effects are not predicted.

Pre-Consultation NIS

Draft Strategy in Combination with...**Waste Action Plan for a Circular Economy (Ireland's National Waste Policy 2020-2025)**

This plan outlines a national roadmap to better embed climate action into waste planning and management. This plan sets out aims and target focusing on the following areas:

- Circular Economy
- Municipal Waste
- Consumer Protection
- Citizen Engagement
- Plastics and Packaging
- Construction and Demolition
- Textiles
- Green Public Procurement and Waste Enforcement

Ireland's integrated National Energy and Climate Plan (NECP) 2021-2030

This plan has been developed in accordance with the Governance of the Energy Union and Climate Action Regulation. The NECP reflects Ireland and the European Union's enhanced ambition on energy and climate target of reducing greenhouse gas emissions by 55% by 2030. This strategy relates to five dimensions of the Energy Union including the following:

- Decarbonisation – GHG Emissions and Removals
- Decarbonisation – Renewable Energy
- Energy Efficiency
- Energy Security
- Internal Energy Market
- Research, Innovation and Competitiveness

Biodiversity Climate Change Sectoral Adaptation Plan (2019) [Prepared under the National Adaptation Framework]

The framework provides strategic focus to ensure adaptation measures are taken across different sectors and levels of government to reduce Ireland's vulnerability to the negative impacts of climate change. There is a requirement for each government department to prepare sectoral plans. The DCHG completed this in relation to Biodiversity. The Biodiversity CCAP sets out the key challenges for biodiversity and the actions needed to increase resilience of our native flora and fauna to the effects of climate change.

Assessment of Effects

The Waste Action Plan outlines the contribution of the sector to the achievement of a number of other national plans and policies including the Climate Action Plan. The Plan shifts focus away from waste disposal to the creation of a circular economy. There is potential for positive in-combination effects as circular economy principles are in line with that supported by the draft Strategy.

The updated draft of the National Energy and Climate Plan continues to support decarbonisation and sets criteria for which policies and measures can be included in the modelling to help achieve climate and energy targets. As such, the main thrust of the Plan is positive, as it addresses climate-change aspects. The NECP is a high-level expression of broad government policy and commitments across a number of existing sector-specific plans which have themselves been subject to environmental assessment including Appropriate Assessment. Projects arising from the Plan will be subject to SEA and AA processes. Therefore, there is no potential for in-combination effects.

The Biodiversity Climate Change Adaptation Plan aims to identify adaptation options that will help to protect biodiversity and ecosystem services from the impacts of changing climate and to enable ecosystems to play their role in increasing resilience to climate change. There is no potential for in-combination effects.

Pre-Consultation NIS

Draft Strategy in Combination with...	Assessment of Effects
<p>Ireland's 4th National Biodiversity Action Plan 2023-2030</p> <p>Ireland's 4th National Biodiversity Action Plan (BAP) 2023-2030 sets the national biodiversity agenda for the period 2023-2030. It is the first national BAP to be published on a statutory basis, under the Wildlife Amendment Act 2023. The legislation also requires selected public service bodies to integrate biodiversity into their plans, policies and programmes, and report to the Minister on progress.</p>	<p>The National Biodiversity Action Plan aims at improving the conservation and protection of the country's biodiversity. There is no potential for in-combination effects.</p>
<p>Clean Air Strategy for Ireland (2023)</p> <p>The strategy aims to 'provide the strategic policy framework necessary to identify and promote the integrated measures across government policy that are required to reduce air pollution and promote cleaner air while delivering on wider national objectives. It sets out the detail of the seven strategic frameworks that will be used to ensure that air quality continues to improve. These frameworks include communications, monitoring, enforcement, legislation, policy developments, ambition and strong governance and targeted policy measures.</p>	<p>The Clean Air Strategy for Ireland acknowledges the impacts that air pollution has on our environments, including those on biodiversity, water quality, and wide ecosystems services, and implements seven strategic frameworks to promote air quality improvements. There is no potential for in-combination effects arising from this strategy as the primary purpose of the Clean Air Strategy for Ireland is to promote improved air quality.</p>
<p>National Policy Framework on Alternative Fuels Infrastructure in Transport 2017-2030</p> <p>This policy framework communicates the Government's longer-term national vision for decarbonising transport by 2050, the cornerstone of which is the ambition that by 2030, all new cars and vans sold in Ireland will be zero emissions capable. Reducing reliance on imported oils and switching to alternative fuels and technologies will be essential to decarbonise the sector.</p>	<p>The National Policy Framework on Alternative Fuels Infrastructure in Transport 2017-2030 has undergone AA and SEA, and a Natura Impact Statement was published in conjunction with the Framework. The framework focuses on reducing reliance on fossil fuels and switching to the use of alternatives in the transport sector, and that biofuels including biomethane will play a key role in this regard. Notably, the draft Strategy aims to implement a Biogas Optimisation Programme and incorporate methane emissions monitoring and control into biogas producing sites. Whereas AD infrastructure can have environmental effects, and potential significant effects on European Sites, all AD developments are required to undergo a planning process to ensure proper consideration of a range of factors, including location, visual impact, land-zoning plans, and ecology. The main thrust of Framework is positive, and there is potential for positive in-combination effects as it supports long-term resilience to climate change. There is potential for positive in-combination effects in relation to the production and generation of alternative fuels which could have resultant impacts such as reduced air emissions. This Framework would not be expected to conflict with any aspects of the draft Strategy.</p>
<p>National Raised Bog Special Areas of Conservation Management Plan 2017-2022</p> <p>The current NPWS programme for the restoration of raised bogs throughout Ireland, as detailed within the National Raised Bog Special Areas of Conservation Management Plan 2017-2022, will deliver ecological benefits for both the raised bog habitats and watercourses downstream of these bogs, through blocking of drains within these sites alongside other measures. This will result in an overall decrease in the sediment loads of the watercourses within the catchments supporting raised bog SACs in addition to restoration of the condition of the raised bog habitats themselves.</p>	<p>The National Raised Bog Special Areas of Conservation Management Plan 2017-2022 outlines management options that will provide for the conservation and better management of European Sites designated for raised bog habitats. There is potential for positive in-combination effects.</p>

Pre-Consultation NIS

Draft Strategy in Combination with...	Assessment of Effects
National Sectoral Plans/Policy	
<p>Water Services Strategic Plan 2050</p> <p>The Water Services Strategic Plan (WSSP) presents Uisce Éireann’s objectives for the next 25 years and the means by which we will achieve them. It aligns to requirements set out in the Water Services (No. 2) Act 2013. The first Water Services Strategic Plan was published in 2015. The Water Service Strategic Plan 2050 (WSSP 2050) has replaced the 2015 plan and has been approved by James Brown TD, Minister for Housing, Local Government and Heritage. The Water Services Strategic Plan 2050, the SEA Statement and AA determination have been adopted by the Uisce Éireann Board.</p>	<p>The WSSP 2050 has undergone SEA and AA. The NIS for the WSSP 2050 has concluded no adverse effects on the integrity of any European Sites subject to the implementation of the mitigation identified within the NIS of the WSSP 2050. An action of the WSSP is to review and implement the National Wastewater Sludge Management Plan. This plan is being subject to assessment in this NIS, and mitigation measures are proposed in Section 7 to address the potential adverse effects that have been identified. Another relevant action of the plan is to work with regulators and stakeholders to develop a Wastewater Strategy Framework. Wastewater source control will form a key part of the framework. This will aim to ensure good regulation of trade effluent discharging to sewer, and that industrial micropollutants are more appropriately treated at source, rather than at end-of-pipe in the UÉ wastewater treatment plant. This is a positive measure that will work towards reducing the potential contaminant load in sludge. Accordingly, provided the mitigation measures in this NIS are implemented in full, there is potential for positive in-combination effects.</p>
<p>Sixth Nitrates Action Programme (2026-2028)</p> <p>Ireland’s Nitrates Action Programme gives effect to the Nitrates Directive, which governs the management of nitrates in agriculture to protect groundwater, rivers, lakes, estuaries and coastal waters. The Sixth NAP runs from 1 January 2026 to 31 December 2028, and includes a focus on nutrient management, knowledge transfer & advisory services, and compliance and enforcement, through a range of regulatory and non-regulatory measures.</p>	<p>Agriculture is a significant pressure for many waterbodies and European sites in Ireland, largely due to losses of excess nutrients to waterbodies. The landspreading of all fertilisers (including biosolids) are regulated in Ireland through the NAP and GAP Regulations. The 6th NAP has undergone SEA and AA. The determination on the NIS for the 6th NAP concluded “... <i>it can be concluded beyond reasonable scientific doubt that the Sixth NAP strategic plan will not adversely affect the integrity of European sites. The EAU is satisfied that a decision to adopt the Sixth NAP strategic plan and the European Union (Good Agricultural Practice for Protection of Waters) Regulations will not adversely affect the integrity of European sites.</i>” Furthermore, biosolids may only be spread on agricultural land in accordance with a NMP as set out in the Waste Management (Use of Sewage Sludge in Agriculture) Regulations 1998 and 2001. The NMP manages the application rates of nutrients and determines the maximum permissible rate of application of nutrients at a local level. This in turn reduces the risk of the application of excess nutrients and therefore leaching/run-off to waterbodies. Taking this into account, adverse in-combination effects are not predicted.</p>
<p>Ireland’s Forest Strategy (2023-2030)</p> <p>This strategy sets out a cross-societal shared national vision for forestry in Ireland. The overarching strategic of the Forest Strategy are ‘People, Planet and Prosperity’. These objectives have been established to develop an internationally competitive and sustainable forestry sector that provides a full range of economic, environmental, and social benefits to society into the future, and which aligns with the Forest Europe definition of sustainable forest management.</p>	<p>Ireland’s Forestry Strategy has been subject to a Strategic Environmental Assessment and Appropriate Assessment. The objectives of Ireland’s Forestry Strategy, in-combination with the objectives of the draft Strategy are not expected to result in adverse effects on European Sites.</p>

Pre-Consultation NIS

Draft Strategy in Combination with...

Forestry Programme 2023-2027

This programme is the main implementation mechanism for the adopted Forest Strategy (2023-2030) which reflects the ambitions contained in the recently published Shared National Vision for Trees, Woods, and Forests in Ireland until 2050. The programme contains eight mechanisms in its aim to deliver more diverse forest which will meet multiple societal objectives, economic, social, and environmental.

Farm to Fork Strategy

The Farm to Fork Strategy is at the heart of the European Green Deal aiming to make food systems fair, healthy and environmentally friendly. The Farm to Fork Strategy aims to accelerate and facilitate the transition to a sustainable food system that should:

- Have a neutral or positive environmental impact;
- Help to mitigate climate change and adapt to its impacts;
- Reverse the loss of biodiversity;
- Preserving and restoring the freshwater and sea-based resources on which the food system depends;
- Protecting land, soil, water, air, plant and animal health and welfare;
- Ensure food security, nutrition and public health, making sure that everyone has access to sufficient, safe, nutritious, sustainable food; and
- Preserve affordability of food while generating fairer economic returns, fostering competitiveness of the EU supply sector and promoting fair trade.

Food Vision 2030 - A World Leader in Sustainable Food Systems

This ten-year strategy is the successor to the current Food Wise 2025 plan and aims to make Ireland a world leader in Sustainable Food Systems over the next decade. Some of the key high-level targets outlined in the strategy include the following:

- Biogenic methane reduction of a minimum of 10% by 2030 (based on 2018 data);
- Nitrous Oxide: Emissions associated with chemical fertiliser use to reduce by more than 50% by 2030;
- Water Quality: The Strategy commits to reduce nutrient losses from agriculture to water by 50% by 2030;
- Biodiversity: It is envisaged that by 2030, 10% of farmed area will be prioritised for biodiversity, spread across all farms throughout the country;
- Air Quality: Ammonia emissions to reduce to 5% below 2005 levels by 2030.

The Programme for Government called for an ambitious blueprint for the sector for the years ahead, adding value sustainably into the future, with a strategic focus on

Assessment of Effects

The Forestry Programme 2023-2027 provides for significant afforestation and the provision for more diverse forestry, which could give rise to adverse impacts on European Sites. However, applications for Forestry Licenses must be submitted to DAFM and are subject to Appropriate Assessment. As such, there is no potential for in-combination effects.

Overarching strategy to achieve food systems that are fair, healthy and environmentally friendly. The strategy is to ensure that the food chain, covering food production, transport, distribution, marketing and consumption, has a neutral or positive environmental impact, preserving and restoring the land, freshwater and sea-based resources on which the food system depends; helping to mitigate climate change and adapting to its impacts; protecting land, soil, water, air, plant and animal health and welfare; and reversing the loss of biodiversity. The Strategy commits to reducing nutrient losses by at least 50%, while ensuring that there is no deterioration in soil fertility. This will reduce the use of fertilisers by at least 20% by 2030. Adverse in-combination effects are not anticipated.

This strategy aims to increase the value of Irish agri-food exports from €14.2 billion in 2020 up to €21 billion by 2030. The strategy aims to achieve this intensification through sustainable steady value growth in a climate smart, environmentally sustainable agri-food sector. The Strategy commits to reduce nutrient losses from agriculture to water by 50% in 2030 in line with the Farm to Fork Strategy. The AA concluded that the adoption of Food Vision 2030 would not have significant adverse effects on the integrity of any Natura 2000 sites. The landspreading of all fertilisers (including biosolids) are regulated in the Republic of Ireland through the NAP and GAP Regulations. The NAP has been subject to AA. Furthermore, biosolids may only be spread on agricultural land in accordance with a NMP as set out in the Waste Management (Use of Sewage Sludge in Agriculture) Regulations 1998 as amended. The NMP manages the application rates of nutrients and determines the maximum permissible rate of application of nutrients at a local level. This in turn reduces the risk of the application of excess nutrients and therefore leaching/run-off to waterbodies. Taking this into account, adverse in-combination effects are not predicted.

Pre-Consultation NIS

Draft Strategy in Combination with...	Assessment of Effects
<p>environmental protection. It is also a key deliverable for agriculture under the Government's Our Rural Future, Ireland's Rural Development Policy 2021-2025.</p>	
<p>Our Rural Future: Rural Development Policy 2021-2025 Represents the Irish Government's blueprint for a post-COVID-19 recovery and development of rural Ireland over the period 2021-2025. It provides the framework to achieve the vision of transforming the quality of lives and opportunity for people living in rural areas. The vision of this policy is for a thriving rural Ireland, which is integral to our national, economic, social, cultural, and environmental wellbeing and development.</p>	<p>It is an environmental commitment of the Rural Development Policy 2021-2025 that any measures giving rise to, or potentially giving rise to, environmental impacts, will be subject to screening and further consideration under Strategic Environmental Assessment (SEA) and/or Appropriate Assessment (AA), and Flood Risk Assessment, as appropriate. As such, there is no potential for in-combination effects.</p>
<p>Ag-Climatise This is the National 'Climate & Air Roadmap' for the Agriculture Sector. The roadmap sets an ambitious vision for a 'climate neutral agriculture sector by 2050' and includes 29 actions with specific and challenging targets aimed at reducing the environmental footprint and further building on the strong credentials of Irish Agriculture. One of the key tasks listed is to reduce nutrient loss to the environment to improve water quality and biodiversity.</p>	<p>Ag-Climatise includes for various actions regarding agricultural practices. For example, actions include the reduction of chemical nitrogen use, achievement of a target of 90% of all slurry spread by low emissions slurry spreading by 2027, reduction of the crude protein content of livestock feeding stuffs. A key action also is increasing the area under tillage production. There is a concern that the expansion or intensification of the agri-food sector may result in additional nutrient losses to the environment. The landspreading of all fertilisers (including biosolids) are regulated in the Republic of Ireland through the NAP and GAP Regulations. The NAP has been subject to AA. Furthermore, biosolids may only be spread on agricultural land in accordance with a NMP as set out in the Waste Management (Use of Sewage Sludge in Agriculture) Regulations 1998 as amended. The NMP manages the application rates of nutrients and determines the maximum permissible rate of application of nutrients at a local level. This in turn reduces the risk of the application of excess nutrients and therefore leaching/run-off to waterbodies. Taking this into account, adverse in-combination effects are not predicted.</p>

7 MITIGATION MEASURES

7.1 Introduction

The draft Strategy has been assessed. The NIS has found that the draft Strategy and its constituent actions are largely not going to result in direct adverse effects on the integrity of European Sites. This finding recognises the nature of the plan, its position in the planning hierarchy and the legal obligations on UÉ as a public authority both in terms of its day-to-day activities as the national water utility and as project developer in the context of planning for new facilities and infrastructure including upgrades.

UÉ as a public authority, is obligated to comply with the provisions of the European Communities (Birds and Natural Habitats) Regulations 2011, as amended. These national legislative instruments transpose the requirements of the EU Habitats Directive - specifically, Article 6(3) and 6(4) for plans and projects and also wider issues of protection of European Sites delivered through other articles of the Directive e.g. Article 6(1) and 6(2). Furthermore, UÉ have made commitments in the draft Strategy that they will ensure that whilst carrying out bioresources management activities they will comply with the obligations under the Birds and Natural Habitats Regulations and the mitigation measures within the SEA and NIS documents.

Notwithstanding this there are a limited number of issues which were identified during the course of the assessment that had potential to give rise to adverse effects on the integrity of European Sites in the absence of additional Plan-specific mitigation measures. These issues principally relate to the need for generally tighter regulation of landspreading of treated wastewater sludge on agricultural and non-agricultural land to prevent adverse effects on the integrity of any European Sites, particularly in light of ongoing research associated with respect to emerging contaminants. The NIS recognises the need for a precautionary approach based on best available scientific information and the need to build in flexibility to pivot where new evidence emerges from ongoing research.

The Plan specific mitigation is presented in **Section 7.2** below.

7.2 Plan Specific Mitigation

7.2.1 Overview of Mitigation Requirements

In terms of regulating the landspreading of biosolids on agricultural land, (currently not spread on non-agricultural lands) this responsibility currently lies with DAFM and local authorities; legislated through the SSD and GAP Regulations. Accordingly, the measures that can be implemented by UÉ to mitigate the potential adverse effects on the integrity of European Sites or their QI/SCI from landspreading of biosolids on agricultural land are focused on: contractual arrangements for those taking the biosolids to ensure that biosolids produced and distributed to contractors by UÉ are spread on agricultural (and non-agricultural) lands in a manner that reduces potential for adverse effects on the integrity of European Sites; improving the evidence base to support decision making; applying risk assessment criteria where uncertainty exists and implementing monitoring and review cycles to ensure adaptive management practices can respond to new information and evidence. To this end, UÉ shall undertake the following:

1. **Produce and implement a Standard Operating Procedure (SOP)**, to be applied at point of distribution of the biosolids from UÉ to the end-user (contractor). The SOP will set out best practice for use of the biosolids for landspreading or reuse on land (agriculture or non-agricultural) and also confirm the end-user's restrictions for use and application of the distributed biosolids. The process for development of this SOP by UÉ is set out in **Section 7.2.2**.
2. Support **research** to inform the evidence base for future revisions or iterations of the Strategy (or its successors) (**Section 7.2.3**).
3. Review the list of parameters to be monitored within biosolids and undertake regular **monitoring** of same (**Section 7.2.4**).
4. **Review** the draft Strategy and the SOP to account for emerging research, policy etc. (**Section 7.2.5**)

7.2.2 Standard Operating Procedure (SOP) for Landspreading of Biosolids

UÉ shall produce and implement a SOP for the landspreading of biosolids. The SOP shall apply to landspreading activities on agricultural and non-agricultural land. All contractors utilising biosolids supplied by UÉ will be required to adhere to this SOP; to be confirmed and controlled by UÉ at point of distribution with appropriate records maintained by UÉ.

A risk-based approach to the development of the SOP shall be adopted. A schematic outlining the key inputs, actions and outputs of the process, including feedback loops, is set out in **Figure 7-1**. The process is described below. The main aim of the SOP is to ensure that the landspreading of biosolids can be safely undertaken without risk to European Sites.

7.2.2.1 Criteria to Ensure no Adverse Effects on the Integrity of European Sites

The steps below (**Section 7.2.2.2**) and **Figure 7-1** set out the broad process for the development of a SOP. It is important that the SOP is capable of ensuring adverse effects on the integrity of European Sites will not occur. To this end, it is imperative that the SOP is developed by suitably competent experts with input from key stakeholders (e.g., NPWS, IFI, EPA).

The avoidance of potential adverse effects on the integrity of European Sites shall be a core principle of the SOP and measures that avoid potential adverse effects on their integrity will be prioritised in the first instance. The main “avoidance” measure is removing the risk entirely. This can be achieved by avoiding land spreading in the first place (e.g., avoiding landspreading within the boundary of a European site or other sensitive areas), or by ensuring the constituents of the biosolids product do not present a risk (e.g., through characterisation of the contaminants within biosolids, and ensuring the biosolids are free from/have a negligible contaminant load).

Therefore, a key part of the SOP development shall be categorising lands³² into different levels of risk, characterising the contaminants within biosolids and identifying “acceptable” contaminant limits and risk, where possible. The characterisation of contaminants within biosolids would require identification of the various contaminants within the biosolids, their source (if this can be determined) and concentration. This would be achieved through monitoring and could also be informed by an assessment of the source of biosolids (e.g., biosolids originating from a WWTP that receives significant industrial effluent/pharmaceutical effluent would likely present a greater risk than biosolids originating from a relatively small WWTP receiving only domestic wastewater with little to no combined sewers on the network). The “risk” will be determined through a risk assessment of the likelihood of adverse effects on the integrity of European Sites occurring. This risk assessment should be based on an exposure assessment (i.e., identifying the path through which contaminants might reach receptors), available data (e.g. see **Table 7-2**), recent research, consultation with relevant stakeholders and biosolids monitoring data. The interactions between risk characterisation of lands and contaminants is shown in **Table 7-1**. As an example, “high” risk lands which could warrant avoidance measures (i.e., not suitable for landspreading) include:

- lands within the boundaries of European Sites³³;
- lands within the “Top 8” pearl mussel catchments (NPWS, 2011);
- lands adjacent to waterbodies (it is acknowledged buffer strips for landspreading are specified in the GAP Regulations and the Code of Good Practice for the Use of Biosolids in Agriculture, but their size and nature may warrant change);
- lands immediately adjacent to open field drains (e.g., the area within a given buffer of a drain as informed by risk assessment);
- floodplains;
- lands where meteorological and/or topographic data indicate a high risk of run-off (e.g., Nash et al. (2023)).

In lands where the risk of adverse effects on the integrity of European Sites is less severe, but nevertheless potentially exists (e.g., lands with subsurface drains, lands that are not in the immediate vicinity of waterbodies, lands adjacent to but not within European Sites), the SOP must identify specific protective

³² Here, “land” or “lands” refers to a land parcel, or part of a land parcel.

³³ Note these may already be protected under Activities Requiring Consent.

Pre-Consultation NIS

measures. Such protective measures should be identified through an exposure assessment, and should (for example) consider the following measures:

- ensuring a densely vegetated and intact buffer of sufficient width (e.g., tens of metres) is located between spread lands and features requiring protection such as European Sites, wetlands, drains, lakes or rivers. The width shall be determined based on best current knowledge and through consultation with key stakeholders (NPWS, IFI, EPA). This vegetated buffer would essentially be an area where landspreading is avoided, but must be maintained in such a way (i.e., kept densely vegetated all year round) to ensure it is effective;
- specifying exclusion criteria, i.e., conditions where land application of biosolids is prohibited;
- specifying the type of product that can be spread in certain areas if applicable;
- ensuring best agronomic practices with a high level of effectiveness to reduce run-off are employed (e.g., the SOP shall set out the timing of spreading as well as landspreading methods, mindful of existing regulations (i.e., the GAP Regulations));

Table 7-1: Indicative Risk-Matrix Highlighting the Interactions Between Risk Characterisation of Lands and Contaminants within Biosolids, and Potential Outcomes of these Interactions.

		Contaminant Characterisation		
		High Risk	Moderate Risk	Low Risk
Land Characterisation	High Risk	Landspreading not acceptable	Landspreading unlikely to be acceptable.	Landspreading unlikely to be acceptable. Although contaminants are a low risk, there may be risk of losses of nutrients within high-risk lands.
	Moderate Risk	Landspreading unlikely to be acceptable	Landspreading potentially acceptable with protective measures. Exposure assessment of contaminants must inform protective measures.	Landspreading acceptable with protective measures.
	Low Risk	Landspreading unlikely to be acceptable	Landspreading potentially acceptable with protective measures. Exposure assessment of contaminants must inform protective measures.	Landspreading acceptable with protective measures.

Data sources and map viewers, both existing and developed in the future by bodies such as DAFM, EPA and NPWS, will be relied upon to identify lands at risk and how this affects suitability for landspreading as part of the implementation of the SOP. These data sources and map viewers will be reviewed to ensure the most current data is informing the identification of lands at risk. Potential data sources that can be relied upon are listed in **Table 7-2**.

The data sources and map viewers utilised will be limited by the quality and spatial resolution of the input data, and it is likely spatial inaccuracies will be encountered. To account for this, a quality check of the lands identified at risk shall be undertaken through a ground-truthing exercise. In addition, the contractor intending to use UÉ biosolids will be required to produce maps of their landholding that show where they intend to spread the biosolids, and this map must demonstrate compliance with the SOP (e.g., by showing the location of rivers/lakes/open drains/subsurface drains, location and size of buffer strips, the location of European Sites, the location of focused delivery flow paths for phosphorus (PIP-P maps, see **Table 7-2**)).

Pre-Consultation NIS

The SOP shall take the form of a document that sets out a protocol for contractors to ensure biosolids can be safely spread on agricultural land with no risk to European Sites. The SOP shall, at a minimum:

- Set out the purpose and scope of the SOP;
- Set out how the SOP “fit's in” with existing regulatory measures and define the regulatory standards and limits;
- Set out additional contaminant limits in soils/biosolids specified by UÉ, if any;
- Define roles and responsibilities;
- Specify biosolids quality assurance requirements (e.g., parameters that must be monitored and their limits, Certificates of Analysis, actions if limits are exceeded). This should include the parameters that determine the various risk levels of contaminants in biosolids;
- Set out standards for landspreading:
 - Specify pre-application monitoring required (e.g., soil monitoring to confirm nutrient and clay content, soil pH, heavy metal concentration, other relevant contaminants);
 - Specify the lands where landspreading of biosolids is prohibited (e.g., within the boundary of European Sites, within a certain distance of rivers/lakes/drains, in areas with a high un-off risk). These measures may ultimately be more stringent than existing regulatory or best practice measures, and this should be made clear where relevant;
 - Specify protective measures (e.g., the need to retain densely vegetated buffer strips adjacent to rivers and drains year-round; conditions where landspreading is prohibited (e.g., waterlogged soil, erosion control measures). These measures may ultimately be more stringent than existing regulatory or best practice measures, and this should be made clear where relevant;
 - Specify the content of the Nutrient Management Plan and minimum qualifications of the individual preparing it;
 - Specify best practice measures for landspreading that must be adhered to;
 - Specify that the contractor will be required to produce maps of their landholding that show where they intend to spread the biosolids and that they are in compliance with the SOP;
- Specify monitoring requirements and record keeping;
- Provide detail of auditing undertaken by UÉ.

Any reports/maps that contractors are required to produce as part of the SOP should be aligned with other reporting requirements where possible to streamline the reporting process.

Table 7-2: Potential Data Sources for Land Suitability/Risk Assessment.

Data	Source
Designated Sites	
SAC and SPA boundaries	NPWS ³⁴
Article 17 Annex I habitat layers	NPWS
SSCO – spatial data	NPWS
Pearl mussel SAC catchments	S.I. No. 296/2009 - The European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009
“Top 8” pearl mussel catchments	NPWS (2011)
Water	
River network	EPA ³⁵
Lakes	EPA

³⁴ NPWS data are available at: <https://www.npws.ie/maps-and-data>

³⁵ EPA data are available at: <https://gis.epa.ie/GetData/Download>

Pre-Consultation NIS

Data	Source
High status objective waterbodies	EPA
Pollution Impact Potential (PIP) maps	EPA
Farm and landscape measures for agriculture	EPA
Flood maps	OPW ³⁶
Groundwater	
Groundwater vulnerability	GSI ³⁷
Wells and springs	GSI
Groundwater karst data	GSI
Groundwater flood data	GSI
Soils	
National soils map (Teagasc)	EPA
National soils hydrology map	EPA
National organic soil map	EPA
Irish peat soil map	Gilet et al. (2024)
Topography	
Contours	GSI ³⁸
Digital Elevation Model	Various
Run-off	
Estimates of runoff volumes and accumulated runoff volumes	Nash et al. (2023)
Landcover	
National Land Cover Map	Tailte Éireann ³⁹
Map of Irish wetlands	Wetland Surveys Ireland and Foss Environmental Consulting ⁴⁰

7.2.2.2 SOP Development and Review

Step 1: Identification of Lands Suitable for Landspreading Biosolids & Risk from Source

The first step in the development of the SOP shall comprise the identification of lands suitable for landspreading biosolids based on a risk assessment, and the identification of sources of biosolids that may present a risk to the integrity of European Sites. The minimum inputs to this risk assessment are set out in **Figure 7-1**, and include elements such as consideration of lands with connectivity to European Sites, catchment/land characteristics (e.g., slope, run-off, groundwater vulnerability), connectivity with an SAC and/or SPA that supports a QI that is actually or potentially at risk from land application of biosolids (based on literature review/up-to-date research), sludge monitoring data and assessment for any significant industrial effluent/pharmaceutical effluent discharging to a municipal wastewater treatment plant.

The main output of this step will be the classification of lands, at an appropriate spatial scale, into risk categories based on the receiving environment, the characterisation of contaminants within biosolids and the identification of biosolid sources that may present a risk to the environment (e.g., biosolids with a high contaminant load, biosolids derived from WWTP accepting industrial wastewater, or biosolids derived from

³⁶ OPW data are available at: <https://www.floodinfo.ie/>

³⁷ GSI data are available at: <https://www.gsi.ie/en-ie/data-and-maps/Pages/default.aspx>

³⁸ Available at: <https://gsi.geodata.gov.ie/portal/home/item.html?id=37e1e7e87c414befaf262c78a4e6ad32>

³⁹ Tailte Éireann data are available at: <https://tailte.ie/map-shop/professional-map-products/national-land-cover-map/>

⁴⁰ Map and data available at: <https://www.wetlandsurveysireland.com/wetlands/map-of-irish-wetlands--/map-of-irish-wetlands---map/>

Pre-Consultation NIS

WWTPs accepting significant stormwater inputs). Sludge monitoring data should be used to inform the latter. Consultation with relevant stakeholders (EPA, IFI, NPWS) is required as part of this step.

Step 2: Review of Existing Measures

Existing measures already in place to protect the environment shall be reviewed. These measures (e.g., as set out in the SSD, GAP and Code of Good Practice for the Use of Biosolids in Agriculture) must be incorporated into the SOP. However, where additional measures (Step 3 below) are different to existing measures, the more stringent measure must be applied.

Step 3: Additional Measures

The range of potential additional measures shall be investigated by UÉ in consultation with relevant stakeholders (EPA, IFI, NPWS). Measures that must be considered include avoidance of landspreading in areas of high run-off risk (e.g., as set out in Nash et al., 2023) and avoidance of landspreading in high-risk areas or from high-risk sources (unless monitoring data show contaminants of concern are absent or in negligible concentrations).

The main output of this step is the identification of additional measures needed to protect European Sites, based on risk category of receiving lands and biosolid source.

Step 4: Standard Operating Procedure

The required standard and additional measures identified as part of the previous steps shall be incorporated into a SOP, to be prepared by UÉ. All contractors utilising UÉ biosolids will be required to implement this SOP.

It will be a requirement of the SOP that there shall be no landspreading of biosolids within European Sites. This measure shall be implemented to remove direct pathways for contaminants potentially in biosolids to European Sites.

Step 5: Review and Monitoring

An important step in the process is auditing as well as ongoing review and monitoring of the evidence base, guidelines and the actual biosolid product. UÉ have already committed to and engage with relevant research projects on emerging contaminants in biosolids (e.g., Terrachem and Safewaste, and will be participating in the new EU Biosolids Observatory project). Findings from these and any other relevant research projects will be integrated into the SOP as appropriate.

It is expected that the SSD and 'Code of Good Practice for the Use of Biosolids in Agriculture – Guidelines for Farmers' and 'Code of Good Practice for the Use of Biosolids in Agriculture – Guidelines for Local Authorities and Wastewater Treatment Plant Operatives' will be revised in the future. The SOP must have regard to all new policy and guidance and be revised accordingly.

Step 6: Adaptive Management

UÉ shall maintain a watching brief of the evidence derived from current and future research, monitoring data, policy and guidance regarding environmental impacts of biosolid landspreading activities; particularly with respect to the effects on European Sites and their designated interests (habitats and species). The SOP shall be kept under review in light of the scientific evidence base, as well as emerging new technology. Importantly, any new evidence that comes to light as part of the watching brief will inform the initial risk assessment step (Step 1). Similarly, monitoring of regulated as well as unregulated contaminants in biosolids shall inform the risk assessment step as well as the range of potential additional measures to be included in the SOP (additional detail re. monitoring is set out in **Section 7.2.4**).

Auditing of contractors shall be undertaken by UÉ to ensure compliance with the SOP, and corrective actions for non-compliance shall be applied. This may include ceasing supply of biosolids to contractors that fail to comply with the SOP.

Pre-Consultation NIS

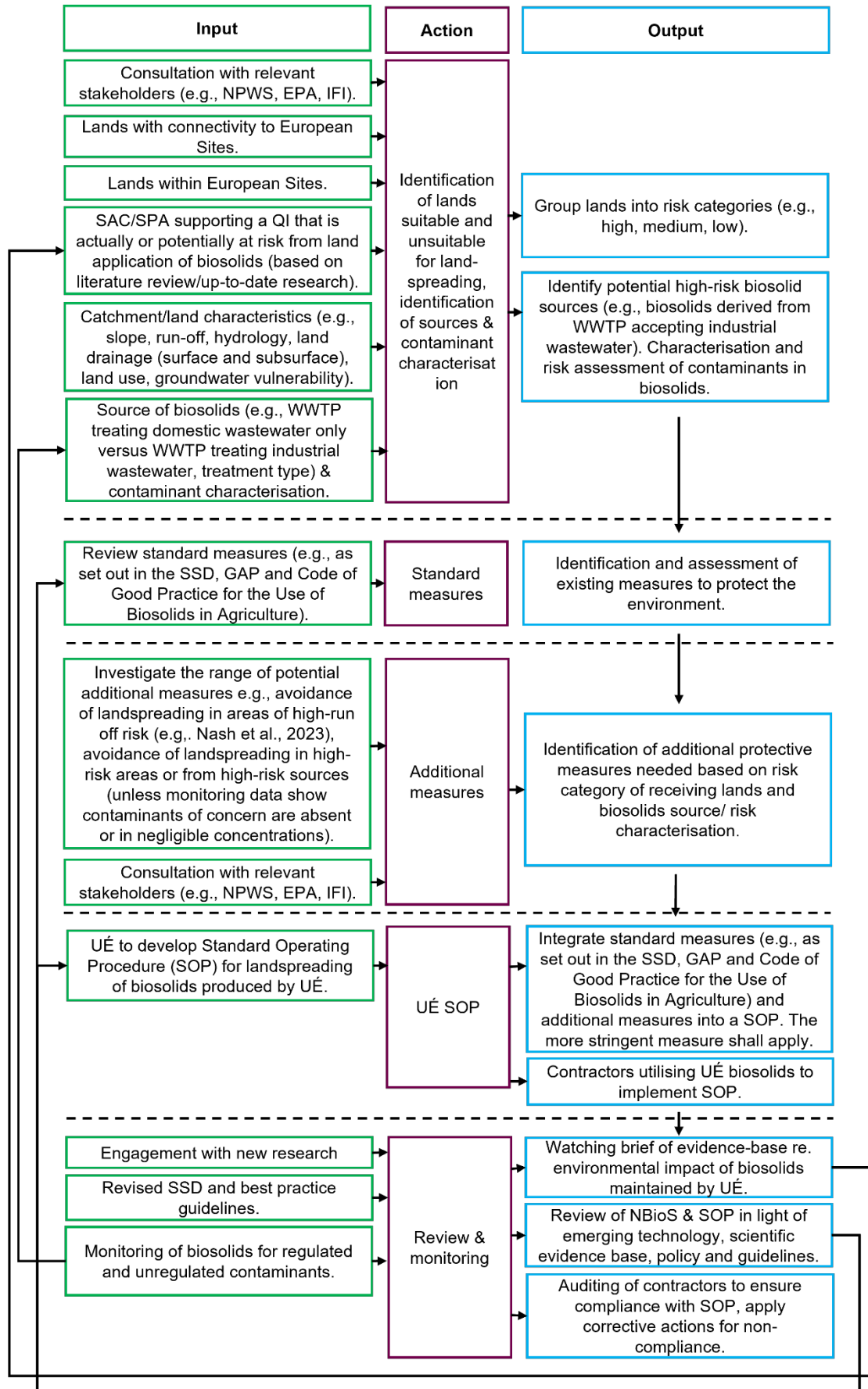


Figure 7-1: Schematic Outlining Proposed Risk-Based Approach to Development of a SOP for the Landspreading of Biosolids Produced by UÉ

Pre-Consultation NIS

7.2.3 Research

UÉ do not have a research remit, however, they can provide support, guidance, and act as stakeholders on relevant projects. This is currently the case - UÉ are participating in EPA research projects on emerging contaminants in biosolids such Terrachem and Safewaste, and will be participating in the new EU Biosolids Observatory project. UÉ shall continue this participation/supporting role.

Whereas UÉ will not be in a position to commission research, the monitoring specified in **Section 7.2.4** will provide the evidence base for informing specific research questions that UÉ consider pertinent. These questions will then be highlighted by UÉ at relevant platforms such as the Sludges and Organic Fertilisers Working Group of which UÉ is part.

7.2.4 Monitoring

In addition to the monitoring already required under the SSD and as part of the Code of Good Practice for Use of Biosolids in Agriculture, UÉ shall undertake monitoring for contaminants of concern in biosolids and the lands to which biosolids have been applied. The following sets out parameters that should be monitored, however, the final list of parameters will be determined by UÉ following consultation with the EPA:

- Microplastics (note: monitoring of microplastics in sludge is already a requirement under the rUWWTD).
- Organic pollutants potentially present in sewage sludges at levels that may induce human health risks identified by Huygens et al. (2022), namely:
 - PAH
 - PCDD/F+dl-PCB
 - PFAS
 - alkylphenols
 - polychlorinated alkanes (SCCPs/MCCPs)
 - polychlorinated naphthalenes (PCNs)
 - phthalate acid esters

7.2.5 Review of the Strategy and NIS Mitigation Measures

New research must be kept under review as part of the draft Strategy. To this end, at a minimum, the Strategy must be reviewed at least every 5 years with careful consideration of new research and evidence with the Objectives and Actions of the Strategy amended as necessary to respond to new research and evidence; particularly with respect to European Sites and their designated interests (habitats and species). The need to review sewage sludge management is acknowledged in the EPA's *Ireland's State of the Environment Report 2024*, which states that a national assessment of sewage sludge in the agricultural setting is needed to gather evidence to inform Ireland's management and tracking systems for these materials in the future (EPA, 2024a). Furthermore, as part of a responsive and flexible adaptive management strategy, the measures set out in the SOP and monitoring requirements will be reviewed and updated as a minimum every three years; in response to new guidelines, policy or legislation regarding the management of biosolids, as well as new evidence regarding the potential effects of the landspreading of biosolids.

8 PRELIMINARY CONCLUSIONS OF APPROPRIATE ASSESSMENT

With reference to Article 6(3) of the EU Habitats Directive, this NIS has considered the draft Strategy could adversely affect the integrity of European Sites with regard to their qualifying interests, associated Conservation Objectives and their overall site integrities. As noted earlier in this NIS, the use of sewage sludge in agriculture is highly regulated in Ireland, with high levels of monitoring and control, and UÉ operate within this regulatory framework. However, the regulations and guidelines require review, and recent risk assessments and research have identified potential risks to the environment from the landspreading of biosolids as a result of losses of contaminants which can occur within biosolids to the environment. Although there are uncertainties with regards to the concentration of these contaminants in Irish sludge as well as the transport (within ecosystems), fate and potential impacts of these contaminants on protected habitats and species, including critical levels or threshold concentrations at which the contaminants might result in an adverse effect on the integrity of European Sites, the precautionary principle has been appropriately applied, and the potential for adverse effects has been identified.

Where actual or potential for adverse effects on integrity have been identified, mitigation to address these effects has been identified. Subject to the mitigation measures being accommodated and reflected within the final Strategy, the Strategy and the actions and activities arising from it will not result in adverse effects on the integrity of European Sites with reference to the requirements of Article 6(3) of the EU Habitats Directive.

9 REFERENCES

- Ankley, G. et al., 2021. Assessing the Ecological Risks of Per- and Polyfluoroalkyl Substances: Current State-of-the Science and a Proposed Path Forward.. *Environ Toxicol Chem.*, 40(3), pp. 564-605.
- Anon, 2025. *Report of the Sludges and Organic Fertilisers Working Group*, s.l.: s.n.
- Arvaniti, O. et al., 2024. Perfluoroalkyl and polyfluoroalkyl substances in sewage sludge: challenges of biological and thermal treatment processes and potential threats to the environment from land disposal. *Environmental Sciences Europe*, 36(207).
- Bonato, T., Pal, T., Benna, C. & Di Maria, F., 2025. Contamination of the terrestrial food chain by per- and polyfluoroalkyl substances (PFAS) and related human health risks: A systematic review. *Science of The Total Environment*, Volume 961.
- Carter, L. J. et al., 2025. Co-contaminant risks in water reuse and biosolids application for agriculture. *Environmental Pollution*, Volume 375.
- CIEEM, 2018. *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.3.*, Winchester: Chartered Institute of Ecology and Environmental Management.
- Clarke, B. & Smith, S., 2011. Review of ‘emerging’ organic contaminants in biosolids and assessment of international research priorities for the agricultural use of biosolids. *Environment International*, 37(1), pp. 226-247.
- Clarke, R. et al., 2016. A quantitative risk assessment for metals in surface water following the application of biosolids to grassland. *Science of the Total Environment*, Volume 556-567, pp. 102-112.
- DEHLG, 2008. *DEHLG Circular: Appropriate Assessment of Land Use Plans. Circular Letter SEA 1/08 & NPWS 1/08*, s.l.: Department of Environment, Heritage and Local Government.
- DEHLG, 2009, revised 2010. *Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities*, s.l.: Department of Environment, Heritage and Local Government.
- DEHLG, 2010. *DEHLG Circular - National Parks and Wildlife Service (NPWS) 1/10 and PSSP 2/10 on Appropriate Assessment under Article 6 of the Habitats Directive – Guidance for Planning Authorities.*, Dublin: Department of the Environment, Heritage and Local Government.
- DHLGH, 2021. *Guidance on the Strict Protection of Certain Animal and Plant Species under the Habitats Directive in Ireland*, s.l.: Department of Housing, Local Government and Heritage.
- Doherty, D., Maoiléidigh, N. & McCarthy, T., 2004. The Biology, Ecology and Future Conservation of Twaite Shad (*Alosa fallax* Lacépède), Allis Shad (*Alosa alosa* L.) and Killarney Shad (*Alosa fallax killarnensis* Tate Regan) in Ireland. *Biology and Environment: Proceedings of the Royal Irish Academy*, 104B(3), pp. 93-102.
- EC, 2000. *Communication from the Commission on the Precautionary Principle*, Brussels: Commission of the European Communities.
- EC, 2013. *Interpretation Manual of European Union Habitats, version EUR 28*, s.l.: European Commission, DG-ENV.
- EC, 2019. *Managing Natura 2000 sites The provisions of Article 6 of the Habitats Directive 92/43/EEC (2019/C 33/01)*, s.l.: Official Journal of the European Union.
- EC, 2021a. *Assessment of plans and projects in relation to Natura 2000 sites – Methodological Guidance on the Provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC*, s.l.: European Commission.
- EC, 2021b. *Commission guidance on the strict protection of animal species of Community interest under the Habitats Directive*, s.l.: European Commission.

Pre-Consultation NIS

- EC, 2023a. *Evaluation of Council Directive 86/278/EEC of 12 June 1986 on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture. Commission Staff Working Document. SWD(2023) 158 final.*, s.l.: European Commission.
- EEA, 2024. *Long-term impacts of sludge spreading on agricultural land (Signal)*. [Online] Available at: <https://www.eea.europa.eu/en/european-zero-pollution-dashboards/indicators/long-term-impacts-of-sludge-spreading-on-agricultural-land#footnote--UjCP> [Accessed 23 April 2025].
- Egle, L. et al., 2023. *Feasibility study in support of future policy developments of the Sewage Sludge Directive (86/278/EEC)*, Luxembourg: Publications Office of the European Union.
- EPA, 2018. *Ireland's Update of National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants 2018*, Johnstown Castle: Environmental Protection Agency.
- EPA, 2023a. *Air Quality in Ireland*, s.l.: Environmental Protection Agency.
- EPA, 2024a. *Ireland's State of the Environment Report 2024*, s.l.: Environmental Protection Agency.
- EPA, 2024b. *Impacts of Pressures on Water Quality - Agriculture*, s.l.: Environmental Protection Agency.
- EPA, 2025a. *Ireland's Air Pollutant Emissions*, s.l.: Environmental Protection Agency.
- EPA, 2025b. *Water Quality in Ireland 2019-2024*, Johnstown Castle, Co. Wexford, Ireland: Environmental Protection Agency.
- Fehily Timoney & Company, 2008a. *Codes of Good Practice for the Use of Biosolids in Agriculture. Guidelines for Farmers*, s.l.: Department of the Environment and Local Government.
- Fehily Timoney & Company, 2008b. *Codes of Good Practice for the Use of Biosolids in Agriculture. Guidelines for Local Authorities and Wastewater Treatment Plant Operatives*, s.l.: Department of the Environment and Local Government.
- Gilet, L., Morley, T. R., Flynn, R. & Connolly, J., 2024. An adaptive mapping framework for the management of peat soils: A new Irish peat soils map. *Geoderma*, Volume 447.
- Government of Ireland, 2023. *Clean Air Strategy for Ireland*, s.l.: s.n.
- Healy, M. et al., 2017. *Health and Water Quality Impacts Arising from Land Spreading of Biosolids (2012-EH-MS-13)*, Johnstown Castle: Environmental Protection Agency.
- Hendry, K. & Cragg-Hine, D., 2003. *Ecology of the Atlantic Salmon. Conserving Natura 2000 Rivers Ecology Series No. 7.*, Peterborough: English Nature.
- Hooge, A. et al., 2023. Fate of microplastics in sewage sludge and in agricultural soils. *Trends in Analytical Chemistry*, 166(117184).
- Huygens, D. et al., 2022. *Screening risk assessment of organic pollutants and environmental impacts from sewage sludge management. JRC Science for Policy Report, EUR 31238 EN*, Luxembourg: Publications Office of the European Union.
- Hyde, B. et al., 2024. *Ireland's Informative Inventory Report 2024. Air Pollutant Emissions 1990-2022*, s.l.: Environmental Protection Agency.
- Irish Water, 2016. *National Wastewater Sludge Management Plan*, s.l.: Irish Water.
- Kelleghan, D. et al., 2022. *Agricultural atmospheric ammonia: identification & assessment of potential impacts. Irish Wildlife Manuals, No. 135.*, s.l.: National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland..
- Kelleghan, D. et al., 2021. Atmospheric ammonia and nitrogen deposition on Irish Natura 2000 sites: Implications for Irish agriculture. *Atmospheric Environment*, Volume 261.
- Kelleghan, D., Hayes, E., Everard, M. & T.P, C., 2019. Mapping ammonia risk on sensitive habitats in Ireland. Volume 649.

Pre-Consultation NIS

- Kelly-Quinn, M., O'Grady, M., Delanty, K. & Bradley, C., 2020. Ireland's Rich and Varied River Resource. In: *Ireland's Rivers*. Dublin: University College Dublin Press.
- Khan, M. et al., 2018. Bioaccumulation of Heavy Metals in Water, Sediments, and Tissues and Their Histopathological Effects on *Anodonta cygnea* (Linea, 1876) in Kabul River, Khyber Pakhtunkhwa, Pakistan.. *Biomed Research International*.
- Lewis, L. J. et al., 2019. *Irish Wetland Bird Survey: Waterbird Status and Distribution 2009/10-2015/16*. *Irish Wildlife Manuals, No. 106*. , s.l.: National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland..
- Mahon, A., Officer, R., Nash, R. & O'Connor, I., 2017. *Scope, Fate, Risks and Impacts of Microplastic Pollution in Irish Freshwater Systems*, s.l.: Environmental Protection Agency.
- Maitland, P., 2003. *Ecology of the River, Brook and Sea Lamprey. Conserving Natura 2000 Rivers Ecology Series No. 5*, Peterborough: English Nature.
- Marchuk, S. et al., 2023. Biosolids-derived fertilisers: A review of challenges and opportunities. *Science of The Total Environment*, 875(162555).
- Markich, S., 2017. Sensitivity of the glochidia (larvae) of freshwater mussels (Bivalvia: Unionida: Hyriidae) to cadmium, copper, lead, nickel and zinc: Differences between metals, species and exposure time.. *Science of the Total Environment*, Volume 601-602, pp. 1427-1436.
- Mateos-Cárdenas, A. et al., 2021. *Impacts of Microplastics in the Irish Freshwater Environment*, s.l.: Environmental Protection Agency.
- Mayes, E., 2008. *Water Framework Directive Annex IV Protected Areas: Water Dependent Habitats and Species and High Status Sites.*, s.l.: s.n.
- Ma, Y. et al., 2025. Concentrations of perfluoroalkyl substances in sediments and wastewater treatment plant-derived biosolids from Ireland. *Science of The Total Environment*, 979(179380).
- Moorkens, E., 2000. *Conservation Management of the Freshwater Pearl Mussel *Margaritifera margaritifera*. Part 2: Water Quality Requirements*, Dublin: Irish Wildlife Manuals, No. 9.
- Nash, R. et al., 2023. *Sources, Pathways and Environmental Fate of Microplastics*, s.l.: Environmental Protection Agency.
- Nicholson, F. et al., 2021. *Review of the evidence base to support the application of low readily available nitrogen organic manures to agricultural land*, s.l.: Water UK Biosolids Network-Club Project.
- NPWS, 2011. *A Strategy for Conservation of the Freshwater Pearl Mussel in Ireland* , s.l.: The National Parks and Wildlife Service.
- NPWS, 2019a. *Conservation objectives supporting document *Najas flexilis* (Willd.) Rostk. & W.L.E. Schmidt. Version 1.*, s.l.: s.n.
- NPWS, 2025a. *The Status of EU Protected Habitats and Species in Ireland. Volume 1: Summary Overview*, s.l.: Unpublished NPWS report. .
- NPWS, 2025b. *The Status of EU Protected Habitats and Species in Ireland: Volume 2 Habitat Assessments*, s.l.: Unpublished NPWS Report.
- NPWS, 2025c. *The Status of EU Protected Habitats and Species in Ireland. Volume 3: Species Assessments*, s.l.: s.n.
- NSAI, 2017. *Water quality - Guidance standard on monitoring freshwater pearl mussel (*Margaritifera margaritifera*) populations and their environment. I.S. E.N. 16859:2017*, s.l.: National Standards Association of Ireland.
- OPR, 2021. *Appropriate Assessment Screening for Development Management*, s.l.: Office of the Planning Regulator.

Pre-Consultation NIS

Österås, A.-H., Allmyr, M. & Sternbeck, J., 2015. *Screening of Organic Pollutants in Sewage Sludge Amended Arable Soils*, s.l.: Swedish Environmental Protection Agency.

Provencher, J. et al., 2020. Proceed with caution: The need to raise the publication bar for microplastics research.. *Science of the Total Environment*, Volume 748.

Rendell-Bhatti, F. et al., 2023. From the environment into the biomass: microplastic uptake in a protected lamprey species. *Environmental Pollution*, Volume 323, p. 121267.

Tavazzi, S. et al., 2012. *Occurrence and levels of selected compounds in European Sewage Sludge Samples. JRC Science for Policy Report, EUR 25598 EN.*, Luxembourg: Publications Office of the European Union.

Wang, N. et al., 2007. Chronic toxicity of copper and ammonia to juvenile freshwater mussels (Unionidae). *Environmental Toxicology and Chemistry*, Volume 26, pp. 2036-2047.



APPENDICES

Appendix A Summary of the
conservation status of protected habitats
and species from 2007 to 2025

Pre-Consultation NIS

ApX Table 1: Assessment results by habitat for 2007, 2013, 2019 and 2025. Extracted from (NPWS, 2025a).

Code	Common name	2007 Overall status	2013 Overall status and operator	2019 Overall status and trend	2025 Overall status and trend	2025 Range	2025 Area	2025 Structure & Functions	2025 Future Prospects
1110	Sandbanks	●	●	=	=	=	=	×	●
1130	Estuaries	●	▲	▼	=	=	=	=	●
1140	Tidal mudflats and sandflats	●	▲	▼	=	=	=	=	●
1150	Lagoons*	●	=	▼	▼	=	=	▼	●
1160	Large shallow inlets and bays	●	▲	▼	▼	=	=	▼	●
1170	Reefs	●	▼	=	=	=	=	×	●
1180	Submarine structures made by leaking gases			=	=	=	=	=	●
1210	Drift lines	●	▼	▼	=	=	=	=	●
1220	Vegetated shingle	●	=	=	▼	=	▼	=	●
1230	Vegetated sea cliffs	●	=	=	=	=	=	=	●
1310	<i>Salicornia mud</i>	●	▼	=	▼	▼	▼	▼	●
1330	Atlantic salt meadows	●	=	▼	▼	=	▼	▼	●
1410	Mediterranean salt meadows	●	=	▼	▼	=	▼	▼	●
1420	Halophilous scrub	●	▼	▼	=	=	=	=	●
2110	Embryonic shifting dunes	●	=	=	▼	=	▼	=	●
2120	Marram dunes (white dunes)	●	=	=	▼	=	▼	▼	●
2130	Fixed dunes (grey dunes)*	●	=	▼	▼	=	▼	▼	●
2140	<i>Empetrum</i> dunes*	●	=	=	=	=	=	=	●
2150	Dune heath*	●	=	=	▼	=	=	▼	●
2170	Dunes with Creeping Willow	●	=	=	▼	=	▼	=	●
2190	Dune slacks	●	▼	▼	▼	=	▼	=	●
21A0	Machair*	●	=	=	=	=	▼	▲	●
3110	Oligotrophic isoetid lake habitat	●	▼	=	×	=	=	×	●
3130	Slender Naiad-type lakes	●	=	▼	▼	=	=	▼	●
3140	Hard-water lakes	●	▼	▼	=	=	=	=	●
3150	Rich pondweed lake habitat	●	=	=	×	=	=	×	●
3160	Acid oligotrophic lakes	●	▼	=	▲	▲	▲	=	●
3180	Turloughs*	●	=	=	=	=	=	×	●
3260	Vegetation of flowing waters	●	▼	▼	▼	=	=	▼	●
3270	<i>Chenopodium rubri</i>	●	●	=	▼	×	▼	=	×

STATUS: ● Favourable ● Unfavourable-Inadequate ● Unfavourable-Bad ● Unknown
 TREND: ▲ Improving = Stable ▼ Deteriorating × Unknown/Uncertain
 Changes in assessment results may be due to a variety of factors, please read the full assessment reports for context.

Pre-Consultation NIS

Code	Common name	2007 Overall status	2013 Overall status and operator	2019 Overall status and trend	2025 Overall status and trend	2025 Range	2025 Area	2025 Structure & Functions	2025 Future Prospects
4010	Wet heaths	●	▬	▼	▼	▬	▼	▬	●
4030	Dry heaths	●	▬	▬	▼	▬	▼	✘	●
4060	Alpine and subalpine heath	●	▲	▲	▬	▬	✘	▬	●
5130	Juniper scrub	●	▬	▬	▬	▬	▬	▬	●
6130	Calaminarian grasslands	●	▬	▼	▼	▼	▼	▬	●
6210	Orchid-rich calcareous grassland*	●	▬	▼	▼	▼	▼	▬	●
6230	Species-rich <i>Nardus</i> grassland*	●	▼	▬	▼	▬	▼	▬	●
6410	<i>Molinia</i> meadows	●	▼	▼	▼	▼	▼	▬	●
6430	Hydrophilous tall-herb swamp	●	▬	▼	▼	▼	▼	▼	●
6510	Hay meadows	●	▬	▼	▲	▲	▲	▲	●
7110	Raised bog (active)*	●	▼	▼	▲	▬	▲	▲	●
7120	Degraded raised bogs	●	▼	▼	▲	▬	▲	▲	●
7130	Blanket bog (active)*	●	▼	▼	▼	▬	▼	▬	●
7140	Transition mires	●	✘	▬	▼	▬	▼	✘	●
7150	Rhynchosporion depressions	●	▼	▼	▼	▬	▼	▬	●
7210	<i>Cladium fens</i> *	●	✘	▬	▼	▬	▼	✘	●
7220	Petrifying springs*	●	▬	▼	▬	▬	▬	▬	●
7230	Alkaline fens	●	✘	▼	▼	▬	▼	✘	●
8110	Siliceous scree	●	▲	▬	▬	▬	▬	▬	●
8120	Calcareous scree	●	▬	▬	▬	▬	▬	▬	●
8210	Calcareous rocky slopes	●	▬	▬	▬	▬	▬	▬	●
8220	Siliceous rocky slopes	●	▬	▬	▬	▬	▬	▬	●
8240	Limestone pavement*	●	▬	▬	▬	▬	▼	▲	●
8310	Caves	●	●	▬	▲	▲	▲	▬	●
8330	Sea caves	●	●	▬	▬	▬	▬	▬	●
91A0	Old oak woodland	●	▲	▼	▼	▬	▼	▬	●
91D0	Bog woodland*	●	●	▬	▼	▬	▬	▼	●
91E0	Alluvial woodland*	●	▲	▼	▼	▬	▼	▬	●
91J0	Yew woodland*	●	▲	▬	▬	▬	▬	▬	●

STATUS: ● Favourable ● Unfavourable-Inadequate ● Unfavourable-Bad ● Unknown
 TREND: ▲ Improving ▬ Stable ▼ Deteriorating ✘ Unknown/Uncertain
 Changes in assessment results may be due to a variety of factors, please read the full assessment reports for context.

Pre-Consultation NIS

Apx Table 2: Assessment results by species for 2007, 2013, 2019 and 2025. Extracted from (NPWS, 2025a).

Code	Species name	Annex	2007 Overall status	2013 Overall status and operator	2019 Overall status and trend	2025 Overall status and trend	2025 Range	2025 Population	2025 Habitat for the species	2025 Future Prospects
6985	Killarney Fern (<i>Vandenboschia speciosa</i>)	II, IV	●	●	▬	▬	▬	▬	▬	●
1528	Marsh Saxifrage (<i>Saxifraga hirculus</i>)	II, IV	●	●	▬	▬	▬	▬	▬	●
1833	Slender Naiad (<i>Najas flexilis</i>)	II, IV	●	▬	▼	▼	▬	▼	▼	●
6216	Shining Sickle Moss (<i>Hamatocaulis vemicosus</i>)	II	●	●	▬	▬	▬	▬	▬	●
1395	Petalwort (<i>Petalophyllum ralfsii</i>)	II	●	●	▬	▬	▬	▬	▬	●
1376	Mäerl (<i>Lithothamnion corallioides</i>)	V	●	▲	▼	▼	▬	▬	▼	●
1377	Mäerl (<i>Phymatholthion calcareum</i>)	V	●	▲	▼	▼	▬	▬	▼	●
1400	White Cushion Moss (<i>Leucobryum glaucum</i>)	V	●	●	▬	▬	▬	▬	▬	●
1409	Sphagnum genus (<i>Sphagnum</i> spp.)	V	●	▬	▬	▬	●	●	●	●
1413	Lycopodium group (<i>Lycopodium</i> spp.)	V	●	▬	▬	▬	●	●	●	●
1378	Cladonia (<i>Cladonia</i> morphotype) species (<i>Cladonia</i> (<i>Cladina</i>) subsp.)	V	●	▬	▬	▬	●	●	●	●
1013	Geyer's Whorl Snail (<i>Vertigo geyeri</i>)	II	●	▼	▼	▼	▼	▼	▼	●
1014	Narrow-mouthed Whorl Snail (<i>Vertigo angustior</i>)	II	●	▼	▼	▼	▼	▼	▼	●
1016	Desmoulin's Whorl Snail (<i>Vertigo mouliinsiana</i>)	II	●	▼	▼	▼	▲	▼	▼	●
1024	Kerry Slug (<i>Geomalacus maculosus</i>)	II, IV	●	●	▲	▲	▲	▲	▬	●
1029	Freshwater Pearl Mussel (<i>Margaritifera margaritifera</i>)	II, V	●	▼	▼	▼	▬	▼	▼	●
1990	Nore Pearl Mussel (<i>Margaritifera durrovensis</i>)	II, V	●	▼						
1092	White-clawed Crayfish (<i>Austropotamobius pallipes</i>)	II, V	●	▬	▼	▼	▼	▼	×	●
1065	Marsh Fritillary (<i>Euphydryas aurinia</i>)	II	●	▼	▲	▲	▲	▲	▲	●
1095	Sea Lamprey (<i>Petromyzon marinus</i>)	II	●	▬	▬	▼	▬	▬	▼	●
1096	Brook Lamprey (<i>Lampetra planeri</i>)	II	●	●	▬	▬	▬	▬	▬	●
1099	River Lamprey (<i>Lampetra fluviatilis</i>)	II, V	●	●	●	×	×	×	▼	●
5046	Killarney Shad (<i>Alosa killarvensis</i>)	II, V	●	●	▬	▬	▬	▬	▬	●
1103	Twaite Shad (<i>Alosa fallax</i>)	II, V	●	▬	▬	▼	▬	▬	▼	●
5076	Pollan (<i>Coregonus pollan</i>)	V	●	×	▬	▬	▬	▬	▬	●
1106	Atlantic Salmon (<i>Salmo salar</i>)	II, V	●	▬	▬	▼	▼	▼	▬	●
6284	Natterjack Toad (<i>Epidalea calamita</i>)	IV	●	▲	▬	▬	▬	×	▬	●
1213	Common Frog (<i>Rana temporaria</i>)	V	●	●	▬	▬	▬	▬	▬	●
1223	Leatherback Turtle (<i>Demochelys coriacea</i>)	IV	●	●	●	●	×	×	×	●
1303	Lesser Horseshoe Bat (<i>Rhinolophus hipposideros</i>)	II, IV	●	●	▼	▲	▲	▲	▲	●
1309	Common Pipistrelle (<i>Pipistrellus pipistrellus</i>)	IV	●	●	▲	▲	▬	▲	▬	●
5009	Soprano Pipistrelle (<i>Pipistrellus pygmaeus</i>)	IV	●	●	▲	▲	▬	▲	▬	●

STATUS: ● Favourable ● Unfavourable-Inadequate ● Unfavourable-Bad ● Unknown ● Vagrant

TREND: ▲ Improving ▬ Stable ▼ Deteriorating × Unknown/Uncertain

Changes in assessment results may be due to a variety of factors, please read the full assessment reports for context.

Pre-Consultation NIS

Code	Species name	Annex	2007 Overall status	2013 Overall status and operator	2019 Overall status and trend	2025 Overall status and trend	2025 Range	2025 Population	2025 Habitat for the species	2025 Future Prospects
1317	Nathusius' Pipistrelle (<i>Pipistrellus nathusii</i>)	IV	●	●	●	●	×	×	=	●
1322	Natterer's Bat (<i>Myotis nattereri</i>)	IV	●	●	=	=	=	×	=	●
1314	Daubenton's Bat (<i>Myotis daubentonii</i>)	IV	●	●	▲	=	=	▼	=	●
1330	Whiskered Bat (<i>Myotis mystacinus</i>)	IV	●	●	=	=	=	×	=	●
1326	Brown Long-eared Bat (<i>Plecotus auritus</i>)	IV	●	●	▲	=	=	=	=	●
1331	Leisler's Bat (<i>Myctalus leisleri</i>)	IV	●	●	▲	▲	=	▲	=	●
1334	Mountain Hare (<i>Lepus timidus</i>)	V	●	●	=	=	=	=	×	●
1355	Otter (<i>Lutra lutra</i>)	II, IV	●	●	▲	=	=	=	×	●
1357	Pine Marten (<i>Martes martes</i>)	V	●	●	▲	▲	▲	▲	▲	●
1364	Grey Seal (<i>Halichoerus grypus</i>)	II, V	●	●	▲	▲	=	▲	=	●
1365	Harbour Seal (<i>Phoca vitulina</i>)	II, V	●	●	=	=	=	=	=	●
1345	Humpback Whale (<i>Megaptera novaeangliae</i>)	IV	●	●	●	=	=	×	=	●
1349	Common Bottlenose Dolphin (<i>Tursiops truncatus</i>)	II, IV	●	●	=	=	=	×	=	●
1350	Short-beaked Common Dolphin (<i>Delphinus delphis</i>)	IV	●	●	=	=	=	=	=	●
1351	Harbour Porpoise (<i>Phocoena phocoena</i>)	II, IV	●	●	=	●	=	×	=	●
2027	Killer Whale (<i>Orcinus orca</i>)	IV	●	●	●	●	=	×	=	●
2029	Long-finned Pilot Whale (<i>Globicephala melas</i>)	IV	●	●	=	=	=	×	=	●
2030	Risso's Dolphin (<i>Grampus griseus</i>)	IV	●	●	=	=	▲	×	=	●
2031	White-sided Dolphin (<i>Lagenorhynchus acutus</i>)	IV	●	●	=	=	=	×	=	●
2032	White-beaked Dolphin (<i>Lagenorhynchus albirostris</i>)	IV	●	●	=	=	=	×	=	●
2034	Striped Dolphin (<i>Stenella coeruleoalba</i>)	IV	●	●	=	=	=	×	=	●
2035	Cuvier's Beaked Whale (<i>Ziphius cavirostris</i>)	IV	●	●	=	=	=	×	=	●
2038	Sowerby's Beaked Whale (<i>Mesoplodon bidens</i>)	IV	●	●	=	=	=	×	=	●
2618	Mink Whale (<i>Balaenoptera acutorostrata</i>)	IV	●	●	=	=	=	×	=	●
2621	Fin Whale (<i>Balaenoptera physalus</i>)	IV	●	●	=	=	=	×	=	●
5020	Blue Whale (<i>Balaenoptera musculus</i>)	IV	●	●	●	●	=	×	=	●
2624	Sperm Whale (<i>Physeter macrocephalus</i>)	IV	●	●	=	=	▲	×	=	●
5033	Northern Bottlenose Whale (<i>Hyperoodon ampullatus</i>)	IV	●	●	●	●	=	×	=	●
2619	Sei Whale (<i>Balaenoptera borealis</i>)	IV	●	●	●	●	=	×	=	●

STATUS: ● Favourable ● Unfavourable-Inadequate ● Unfavourable-Bad ● Unknown ● Vagrant
 TREND: ▲ Improving = Stable ▼ Deteriorating × Unknown/Uncertain
 Changes in assessment results may be due to a variety of factors, please read the full assessment reports for context.

Pre-Consultation NIS

Code	Species name	Annex	2007 Overall status	2013 Overall status and operator	2019 Overall status and trend	2025 Overall status and trend	2025 Range	2025 Population	2025 Habitat for the species	2025 Future Prospects
1348	Northern Right Whale (<i>Eubalaena glacialis</i>)	IV	●	●	●	●	●	●	●	●
2028	False Killer Whale (<i>Pseudorca crassidens</i>)	IV	●	●	●	●	●	●	●	●
2037	True's Beaked Whale (<i>Mesoplodon mirus</i>)	IV	●	●	●	●	●	●	●	●
2622	Pygmy Sperm Whale (<i>Kogia breviceps</i>)	IV	●	●	●	●	●	●	●	●
5029	Beluga/White Whale (<i>Delphinapterus leucas</i>)	IV	●	●	●	●	●	●	●	●
5034	Gervais' Beaked Whale (<i>Mesoplodon europaeus</i>)	IV	●	●	●	●	●	●	●	●
1102	Allis Shad (<i>Alosa alosa</i>)	II, V	●	●	●	●	●	●	●	●
1320	Brandt's Bat (<i>Myotis brandtii</i>)	IV	●	●	●	●	●	●	●	●
1304	Greater Horseshoe Bat (<i>Rhinolophus ferrumequinum</i>)	II, IV	●	●	●	●	●	●	●	●

STATUS: ● Favourable ● Unfavourable-Inadequate ● Unfavourable-Bad ● Unknown ● Vagrant

TREND: ▲ Improving ▬ Stable ▼ Deteriorating ✕ Unknown/Uncertain

Changes in assessment results may be due to a variety of factors, please read the full assessment reports for context.



Appendix B List of SACs in the Republic of Ireland

Pre-Consultation NIS

ApX Table 3: List of SACs in the Republic of Ireland.

Site Code	Site Name
IE0000006	Killyconny Bog (Cloghbally) SAC
IE0000007	Lough Oughter and Associated Loughs SAC
IE0000014	Ballyallia Lake SAC
IE0000016	Ballycullinan Lake SAC
IE0000019	Ballyogan Lough SAC
IE0000020	Black Head-Poulsallagh Complex SAC
IE0000030	Danes Hole, Poulnalecka SAC
IE0000032	Dromore Woods and Loughs SAC
IE0000036	Inagh River Estuary SAC
IE0000037	Pouladatig Cave SAC
IE0000051	Lough Gash Turlough SAC
IE0000054	Moneen Mountain SAC
IE0000057	Moyree River System SAC
IE0000064	Poulnagordon Cave (Quin) SAC
IE0000077	Ballymacoda (Clonpriest and Pillmore) SAC
IE0000090	Glengarriff Harbour and Woodland SAC
IE0000091	Clonakilty Bay SAC
IE0000093	Caha Mountains SAC
IE0000097	Lough Hyne Nature Reserve and Environs SAC
IE0000101	Roaringwater Bay and Islands SAC
IE0000102	Sheep's Head SAC
IE0000106	St. Gobnet's Wood SAC
IE0000108	The Gearagh SAC
IE0000109	Three Castle Head to Mizen Head SAC
IE0000111	Aran Island (Donegal) Cliffs SAC
IE0000115	Ballintra SAC
IE0000116	Ballyarr Wood SAC
IE0000129	Croaghonagh Bog SAC
IE0000133	Donegal Bay (Murvagh) SAC
IE0000138	Durnesh Lough SAC
IE0000140	Fawnboy Bog/Lough Nacung SAC
IE0000142	Gannivegil Bog SAC
IE0000147	Horn Head and Rinclevan SAC
IE0000154	Inishtrahull SAC
IE0000163	Lough Eske and Ardnamona Wood SAC
IE0000164	Lough Nagreany Dunes SAC
IE0000165	Lough Nillan Bog (Carrickatieve) SAC
IE0000168	Magheradrumman Bog SAC
IE0000172	Meenaguse/Ardbane Bog SAC
IE0000173	Meentygrannagh Bog SAC
IE0000174	Curraghchase Woods SAC
IE0000181	Rathlin O'Birne Island SAC

Pre-Consultation NIS

Site Code	Site Name
IE0000185	Sessiagh Lough SAC
IE0000189	Slieve League SAC
IE0000190	Slieve Tooley/Tormore Island/Loughros Beg Bay SAC
IE0000191	St. John's Point SAC
IE0000194	Tranarossan and Melmore Lough SAC
IE0000197	West of Ardara/Maas Road SAC
IE0000199	Baldoyle Bay SAC
IE0000202	Howth Head SAC
IE0000204	Lambay Island SAC
IE0000205	Malahide Estuary SAC
IE0000206	North Dublin Bay SAC
IE0000208	Rogerstown Estuary SAC
IE0000210	South Dublin Bay SAC
IE0000212	Inishmaan Island SAC
IE0000213	Inishmore Island SAC
IE0000216	River Shannon Callows SAC
IE0000218	Coolcam Turlough SAC
IE0000231	Barroughter Bog SAC
IE0000238	Caherglassaun Turlough SAC
IE0000242	Castletaylor Complex SAC
IE0000248	Cloonmoylan Bog SAC
IE0000252	Coole-Garryland Complex SAC
IE0000255	Croaghill Turlough SAC
IE0000261	Derrycrag Wood Nature Reserve SAC
IE0000268	Galway Bay Complex SAC
IE0000278	Inishbofin and Inishshark SAC
IE0000285	Kilsallagh Bog SAC
IE0000286	Kiltartan Cave (Coole) SAC
IE0000295	Levally Lough SAC
IE0000296	Lisnageeragh Bog and Ballinastack Turlough SAC
IE0000297	Lough Corrib SAC
IE0000299	Lough Cutra SAC
IE0000301	Lough Lurteen Bog/Glenamaddy Turlough SAC
IE0000304	Lough Rea SAC
IE0000308	Loughatorick South Bog SAC
IE0000318	Peterswell Turlough SAC
IE0000319	Pollnacknockaun Wood Nature Reserve SAC
IE0000322	Rahasane Turlough SAC
IE0000324	Rosroe Bog SAC
IE0000326	Shankill West Bog SAC
IE0000328	Slyne Head Islands SAC
IE0000330	Tully Mountain SAC
IE0000332	Akeragh, Banna and Barrow Harbour SAC
IE0000335	Ballinskelligs Bay and Inny Estuary SAC

Pre-Consultation NIS

Site Code	Site Name
IE0000343	Castlemaine Harbour SAC
IE0000353	Old Domestic Building, Dromore Wood SAC
IE0000364	Kilgarvan Ice House SAC
IE0000365	Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC
IE0000370	Lough Yganavan and Lough Nambrackdarrig SAC
IE0000375	Mount Brandon SAC
IE0000382	Sheheree (Ardagh) Bog SAC
IE0000391	Ballynafagh Bog SAC
IE0000396	Pollardstown Fen SAC
IE0000397	Red Bog, Kildare SAC
IE0000404	Hugginstown Fen SAC
IE0000407	The Loughans SAC
IE0000412	Slieve Bloom Mountains SAC
IE0000428	Lough Melvin SAC
IE0000432	Barrigone SAC
IE0000439	Tory Hill SAC
IE0000440	Lough Ree SAC
IE0000448	Fortwilliam Turlough SAC
IE0000453	Carlingford Mountain SAC
IE0000455	Dundalk Bay SAC
IE0000458	Killala Bay/Moy Estuary SAC
IE0000461	Arckill Turlough SAC
IE0000463	Balla Turlough SAC
IE0000466	Bellacorick Iron Flush SAC
IE0000470	Mullet/Blacksod Bay Complex SAC
IE0000471	Brackloon Woods SAC
IE0000472	Broadhaven Bay SAC
IE0000474	Ballymaglancy Cave, Cong SAC
IE0000475	Carrowkeel Turlough SAC
IE0000476	Carrowmore Lake Complex SAC
IE0000479	Cloughmoyne SAC
IE0000480	Clyard Kettle-holes SAC
IE0000484	Cross Lough (Killadoon) SAC
IE0000485	Corraun Plateau SAC
IE0000492	Doocastle Turlough SAC
IE0000495	Duvillaun Islands SAC
IE0000497	Flughany Bog SAC
IE0000500	Glenamoy Bog Complex SAC
IE0000503	Greaghans Turlough SAC
IE0000504	Kilglassan/Caheravoostia Turlough Complex SAC
IE0000507	Inishkea Islands SAC
IE0000516	Lackan Saltmarsh and Kilcummin Head SAC
IE0000522	Lough Gall Bog SAC
IE0000525	Shrule Turlough SAC

Pre-Consultation NIS

Site Code	Site Name
IE0000527	Moore Hall (Lough Carra) SAC
IE0000532	Oldhead Wood SAC
IE0000534	Owenduff/Nephin Complex SAC
IE0000541	Skealaghan Turlough SAC
IE0000542	Slieve Fyagh Bog SAC
IE0000566	All Saints Bog and Esker SAC
IE0000571	Charleville Wood SAC
IE0000572	Clara Bog SAC
IE0000575	Ferbane Bog SAC
IE0000576	Fin Lough (Offaly) SAC
IE0000580	Mongan Bog SAC
IE0000581	Moyclare Bog SAC
IE0000582	Raheenmore Bog SAC
IE0000584	Cuilcagh - Anierin Uplands SAC
IE0000585	Sharavogue Bog SAC
IE0000588	Ballinturly Turlough SAC
IE0000592	Bellanagare Bog SAC
IE0000595	Callow Bog SAC
IE0000597	Carrowbehy/Caher Bog SAC
IE0000600	Cloonchambers Bog SAC
IE0000604	Derrinea Bog SAC
IE0000606	Lough Fingall Complex SAC
IE0000607	Errit Lough SAC
IE0000609	Lisduff Turlough SAC
IE0000610	Lough Croan Turlough SAC
IE0000611	Lough Funshinagh SAC
IE0000612	Mullygollan Turlough SAC
IE0000614	Cloonshanville Bog SAC
IE0000622	Ballysadare Bay SAC
IE0000623	Ben Bulben, Gleniff and Glenade Complex SAC
IE0000625	Bunduff Lough and Machair/Trawalua/Mullaghmore SAC
IE0000627	Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC
IE0000633	Lough Hoe Bog SAC
IE0000634	Lough Nabrickkeagh Bog SAC
IE0000636	Templehouse and Cloonacleigha Loughs SAC
IE0000637	Turloughmore (Sligo) SAC
IE0000638	Union Wood SAC
IE0000641	Ballyduff/Clonfinane Bog SAC
IE0000646	Galtee Mountains SAC
IE0000647	Kilcarren-Firville Bog SAC
IE0000665	Helvick Head SAC
IE0000668	Nier Valley Woodlands SAC
IE0000671	Tramore Dunes and Backstrand SAC
IE0000679	Garriskil Bog SAC

Pre-Consultation NIS

Site Code	Site Name
IE0000685	Lough Ennell SAC
IE0000688	Lough Owel SAC
IE0000692	Scragh Bog SAC
IE0000696	Ballyteige Burrow SAC
IE0000697	Bannow Bay SAC
IE0000700	Cahore Polders and Dunes SAC
IE0000704	Lady's Island Lake SAC
IE0000707	Saltee Islands SAC
IE0000708	Screen Hills SAC
IE0000709	Tacumshin Lake SAC
IE0000710	Raven Point Nature Reserve SAC
IE0000713	Ballyman Glen SAC
IE0000714	Bray Head SAC
IE0000716	Carriggower Bog SAC
IE0000717	Deputy's Pass Nature Reserve SAC
IE0000719	Glen of the Downs SAC
IE0000725	Knocksink Wood SAC
IE0000729	Buckronev-Brittis Dunes and Fen SAC
IE0000733	Vale of Clara (Rathdrum Wood) SAC
IE0000764	Hook Head SAC
IE0000770	Blackstairs Mountains SAC
IE0000781	Slaney River Valley SAC
IE0000831	Cullahill Mountain SAC
IE0000849	Spahill and Clomantagh Hill SAC
IE0000859	Clonaslee Eskers and Derry Bog SAC
IE0000869	Lisbigney Bog SAC
IE0000919	Ridge Road, SW of Rapemills SAC
IE0000925	The Long Derries, Edenderry SAC
IE0000930	Clare Glen SAC
IE0000934	Kilduff, Devilsbit Mountain SAC
IE0000939	Silvermine Mountains SAC
IE0000979	Corratirrim SAC
IE0000994	Ballyteige (Clare) SAC
IE0000996	Ballyvaughan Turlough SAC
IE0001013	Glenomra Wood SAC
IE0001021	Carrowmore Point to Spanish Point and Islands SAC
IE0001040	Barley Cove to Ballyrisode Point SAC
IE0001043	Cleanderry Wood SAC
IE0001058	Great Island Channel SAC
IE0001061	Kilkeran Lake and Castlefreke Dunes SAC
IE0001070	Myross Wood SAC
IE0001090	Ballyness Bay SAC
IE0001107	Coolvoy Bog SAC
IE0001125	Dunragh Loughs/Pettigo Plateau SAC

Pre-Consultation NIS

Site Code	Site Name
IE0001141	Gweedore Bay and Islands SAC
IE0001151	Kindrum Lough SAC
IE0001179	Muckish Mountain SAC
IE0001190	Sheephaven SAC
IE0001195	Termon Strand SAC
IE0001197	Keeper Hill SAC
IE0001209	Glenasmole Valley SAC
IE0001228	Aughrusbeg Machair and Lake SAC
IE0001230	Courtmacsherry Estuary SAC
IE0001242	Carrownagappul Bog SAC
IE0001251	Cregduff Lough SAC
IE0001257	Dog's Bay SAC
IE0001271	Gortnandarragh Limestone Pavement SAC
IE0001275	Inisheer Island SAC
IE0001285	Kiltiernan Turlough SAC
IE0001309	Omey Island Machair SAC
IE0001311	Rusheenduff Lough SAC
IE0001312	Ross Lake and Woods SAC
IE0001313	Rosturra Wood SAC
IE0001321	Termon Lough SAC
IE0001342	Cloonee and Inchiquin Loughs, Uragh Wood SAC
IE0001371	Mucksna Wood SAC
IE0001387	Ballynafagh Lake SAC
IE0001398	Rye Water Valley/Carlton SAC
IE0001403	Arroo Mountain SAC
IE0001430	Glen Bog SAC
IE0001432	Glenstal Wood SAC
IE0001459	Clogher Head SAC
IE0001482	Clew Bay Complex SAC
IE0001497	Doogort Machair/Lough Doo SAC
IE0001501	Erris Head SAC
IE0001513	Keel Machair/Menaun Cliffs SAC
IE0001529	Lough Cahasy, Lough Baun and Roonah Lough SAC
IE0001536	Mocorha Lough SAC
IE0001547	Castletownshend SAC
IE0001571	Urlaur Lakes SAC
IE0001625	Castlesampson Esker SAC
IE0001626	Annaghmore Lough (Roscommon) SAC
IE0001637	Four Roads Turlough SAC
IE0001656	Bricklieve Mountains and Keishcorran SAC
IE0001669	Knockalongy and Knockachree Cliffs SAC
IE0001673	Lough Arrow SAC
IE0001680	Streedagh Point Dunes SAC
IE0001683	Liskeenan Fen SAC

Pre-Consultation NIS

Site Code	Site Name
IE0001741	Kilmuckridge-Tinnaberna Sandhills SAC
IE0001742	Kilpatrick Sandhills SAC
IE0001757	Holdenstown Bog SAC
IE0001766	Magherabeg Dunes SAC
IE0001774	Lough Carra/Mask Complex SAC
IE0001776	Pilgrim's Road Esker SAC
IE0001786	Kilroosky Lough Cluster SAC
IE0001810	White Lough, Ben Loughs and Lough Doo SAC
IE0001818	Lough Forbes Complex SAC
IE0001831	Split Hills and Long Hill Esker SAC
IE0001847	Philipston Marsh SAC
IE0001858	Galmoy Fen SAC
IE0001873	Derryclogher (Knockboy) Bog SAC
IE0001879	Glanmore Bog SAC
IE0001880	Meenaguse Scragh SAC
IE0001881	Maulagowna Bog SAC
IE0001890	Mullaghanish Bog SAC
IE0001898	Unshin River SAC
IE0001899	Cloonakillina Lough SAC
IE0001912	Glendree Bog SAC
IE0001913	Sonnagh Bog SAC
IE0001919	Glenade Lough SAC
IE0001922	Bellacorick Bog Complex SAC
IE0001926	East Burren Complex SAC
IE0001932	Mweelrea/Sheeffry/Erriff Complex SAC
IE0001952	Comeragh Mountains SAC
IE0001955	Croaghaun/Slievemore SAC
IE0001957	Boyne Coast and Estuary SAC
IE0001975	Ballyhoorisky Point to Fanad Head SAC
IE0001976	Lough Gill SAC
IE0001992	Tamur Bog SAC
IE0002005	Bellacragher Saltmarsh SAC
IE0002006	Ox Mountains Bogs SAC
IE0002008	Maumturk Mountains SAC
IE0002010	Old Domestic Building (Keevagh) SAC
IE0002012	North Inishowen Coast SAC
IE0002031	The Twelve Bens/Garraun Complex SAC
IE0002032	Boleybrack Mountain SAC
IE0002034	Connemara Bog Complex SAC
IE0002036	Ballyhoura Mountains SAC
IE0002037	Carrigeenamronety Hill SAC
IE0002041	Old Domestic Building, Curraglass Wood SAC
IE0002047	Cloghernagore Bog and Glenveagh National Park SAC
IE0002070	Tralee Bay and Magharees Peninsula, West to Cloghane SAC

Pre-Consultation NIS

Site Code	Site Name
IE0002074	Slyne Head Peninsula SAC
IE0002081	Ballinafad SAC
IE0002091	Newhall and Edenvale Complex SAC
IE0002098	Old Domestic Building, Askive Wood SAC
IE0002110	Corliskea/Trien/Cloonfelliv Bog SAC
IE0002111	Kilkieran Bay and Islands SAC
IE0002112	Ballyseedy Wood SAC
IE0002117	Lough Coy SAC
IE0002118	Barnahallia Lough SAC
IE0002119	Lough Nageeron SAC
IE0002120	Lough Bane and Lough Glass SAC
IE0002121	Lough Lene SAC
IE0002122	Wicklow Mountains SAC
IE0002123	Ardmore Head SAC
IE0002124	Bolingbrook Hill SAC
IE0002125	Anglesey Road SAC
IE0002126	Pollagoona Bog SAC
IE0002129	Murvey Machair SAC
IE0002130	Tully Lough SAC
IE0002135	Lough Nageage SAC
IE0002137	Lower River Suir SAC
IE0002141	Mountmellick SAC
IE0002144	Newport River SAC
IE0002147	Lisduff Fen SAC
IE0002157	Newgrove House SAC
IE0002158	Kenmare River SAC
IE0002159	Mulroy Bay SAC
IE0002161	Long Bank SAC
IE0002162	River Barrow and River Nore SAC
IE0002164	Lough Golagh and Breesy Hill SAC
IE0002165	Lower River Shannon SAC
IE0002170	Blackwater River (Cork/Waterford) SAC
IE0002171	Bandon River SAC
IE0002172	Blasket Islands SAC
IE0002173	Blackwater River (Kerry) SAC
IE0002176	Leannan River SAC
IE0002177	Lough Dahybaun SAC
IE0002179	Towerhill House SAC
IE0002180	Gortacarnaun Wood SAC
IE0002181	Drummin Wood SAC
IE0002185	Slieve Mish Mountains SAC
IE0002187	Drongawn Lough SAC
IE0002189	Farranamanagh Lough SAC

Pre-Consultation NIS

Site Code	Site Name
IE0002193	Ireland's Eye SAC
IE0002197	Derrinlough (Cloonkeenleananode) Bog SAC
IE0002199	Ballygar (Aghrane) Bog SAC
IE0002200	Aughrim (Aghrane) Bog SAC
IE0002201	Derragh Bog SAC
IE0002202	Mount Jessop Bog SAC
IE0002203	Girley (Drewstown) Bog SAC
IE0002205	Wooddown Bog SAC
IE0002206	Scohaboy (Sopwell) Bog SAC
IE0002207	Arragh More (Derrybreen) Bog SAC
IE0002213	Glenloughaun Esker SAC
IE0002214	Killeglan Grassland SAC
IE0002236	Island Fen SAC
IE0002241	Lough Derg, North-east Shore SAC
IE0002243	Clare Island Cliffs SAC
IE0002244	Ardrahan Grassland SAC
IE0002245	Old Farm Buildings, Ballymacrogan SAC
IE0002246	Ballycullinan, Old Domestic Building SAC
IE0002247	Toonagh Estate SAC
IE0002249	The Murrough Wetlands SAC
IE0002250	Carrowmore Dunes SAC
IE0002252	Thomastown Quarry SAC
IE0002256	Ballyprior Grassland SAC
IE0002257	Moanour Mountain SAC
IE0002258	Silvermines Mountains West SAC
IE0002259	Tory Island Coast SAC
IE0002261	Magharee Islands SAC
IE0002262	Valencia Harbour/Portmagee Channel SAC
IE0002263	Kerry Head Shoal SAC
IE0002264	Kilkee Reefs SAC
IE0002265	Kingstown Bay SAC
IE0002267	Porcupine Shelf SAC
IE0002268	Achill Head SAC
IE0002269	Carnsore Point SAC
IE0002274	Wicklow Reef SAC
IE0002278	Southern Canyons SAC
IE0002279	Askeaton Fen Complex SAC
IE0002280	Dunbeacon Shingle SAC
IE0002281	Reen Point Shingle SAC
IE0002283	Rutland Island and Sound SAC
IE0002287	Lough Swilly SAC
IE0002293	Carrowbaun, Newhall and Ballylee Turloughs SAC
IE0002294	Cahermore Turlough SAC
IE0002295	Ballinduff Turlough SAC

Pre-Consultation NIS

Site Code	Site Name
IE0002296	Williamstown Turloughs SAC
IE0002298	River Moy SAC
IE0002299	River Boyne and River Blackwater SAC
IE0002301	River Finn SAC
IE0002303	Dunmuckrum Turloughs SAC
IE0002306	Carlingford Shore SAC
IE0002312	Slieve Bernagh Bog SAC
IE0002313	Ballymore Fen SAC
IE0002314	Old Domestic Buildings, Rylane SAC
IE0002315	Glanlough Woods SAC
IE0002316	Ratty River Cave SAC
IE0002317	Cregg House Stables, Crusheen SAC
IE0002318	Knockanira House SAC
IE0002319	Kilkishen House SAC
IE0002320	Kildun Souterrain SAC
IE0002324	Glendine Wood SAC
IE0002327	Belgica Mound Province SAC
IE0002328	Hovland Mound Province SAC
IE0002329	South-west Porcupine Bank SAC
IE0002330	North-west Porcupine Bank SAC
IE0002331	Mouds Bog SAC
IE0002332	Coolrain Bog SAC
IE0002333	Knockacoller Bog SAC
IE0002336	Carn Park Bog SAC
IE0002337	Crosswood Bog SAC
IE0002338	Drumalough Bog SAC
IE0002339	Ballynamona Bog and Corkip Lough SAC
IE0002340	Moneybeg and Clareisland Bogs SAC
IE0002341	Ardagullion Bog SAC
IE0002342	Mount Hevey Bog SAC
IE0002343	Tullaheer Lough and Bog SAC
IE0002346	Brown Bog SAC
IE0002347	Camderry Bog SAC
IE0002348	Clooneen Bog SAC
IE0002349	Corbo Bog SAC
IE0002350	Curraglehanagh Bog SAC
IE0002351	Moanveanlagh Bog SAC
IE0002352	Monivea Bog SAC
IE0002353	Redwood Bog SAC
IE0002354	Tullaghanrock Bog SAC
IE0002356	Ardgraique Bog SAC
IE0002953	Blackwater Bank SAC
IE0002998	West Connacht Coast SAC
IE0002999	Hempton's Turbot Bank SAC

Pre-Consultation NIS

Site Code	Site Name
IE0003000	Rockabill to Dalkey Island SAC
IE0003001	Porcupine Bank Canyon SAC
IE0003002	South-east Rockall Bank SAC
IE0003015	Codling Fault Zone SAC

Source: NPWS data sheets. Available at: <https://www.npws.ie/maps-and-data/designated-site-data/sac-and-spa-datasheets-downloads> [Accessed 18/03/2026].

Appendix C List of SPAs in the Republic of Ireland

Pre-Consultation NIS

ApX Table 4: List of SPAs in the Republic of Ireland.

Site Code	Site Name
IE0004002	Saltee Islands SPA
IE0004003	Puffin Island SPA
IE0004004	Inishkea Islands SPA
IE0004005	Cliffs of Moher SPA
IE0004006	North Bull Island SPA
IE0004007	Skelligs SPA
IE0004008	Blasket Islands SPA
IE0004009	Lady's Island Lake SPA
IE0004013	Drumcliff Bay SPA
IE0004014	Rockabill SPA
IE0004015	Rogerstown Estuary SPA
IE0004016	Baldoyle Bay SPA
IE0004017	Mongan Bog SPA
IE0004019	The Raven SPA
IE0004020	Ballyteige Burrow SPA
IE0004021	Old Head of Kinsale SPA
IE0004022	Ballycotton Bay SPA
IE0004023	Ballymacoda Bay SPA
IE0004024	South Dublin Bay and River Tolka Estuary SPA
IE0004025	Malahide Estuary SPA
IE0004026	Dundalk Bay SPA
IE0004027	Tramore Back Strand SPA
IE0004028	Blackwater Estuary SPA
IE0004029	Castlemaine Harbour SPA
IE0004030	Cork Harbour SPA
IE0004031	Inner Galway Bay SPA
IE0004032	Dungarvan Harbour SPA
IE0004033	Bannow Bay SPA
IE0004034	Trawbreaga Bay SPA
IE0004035	Cummeen Strand SPA
IE0004036	Killala Bay/Moy Estuary SPA
IE0004037	Blacksod Bay/Broad Haven SPA
IE0004038	Killarney National Park SPA
IE0004039	Derryveagh and Glendowan Mountains SPA
IE0004040	Wicklow Mountains SPA
IE0004041	Ballyallia Lough SPA
IE0004042	Lough Corrib SPA
IE0004043	Lough Derravaragh SPA
IE0004044	Lough Ennell SPA
IE0004045	Glen Lough SPA
IE0004046	Lough Iron SPA
IE0004047	Lough Owel SPA

Pre-Consultation NIS

Site Code	Site Name
IE0004048	Lough Gara SPA
IE0004049	Lough Oughter Complex SPA
IE0004050	Lough Arrow SPA
IE0004051	Lough Carra SPA
IE0004052	Carrowmore Lake SPA
IE0004056	Lough Cutra SPA
IE0004057	Lough Derg (Donegal) SPA
IE0004058	Lough Derg (Shannon) SPA
IE0004060	Lough Fern SPA
IE0004061	Lough Kinale and Derragh Lough SPA
IE0004062	Lough Mask SPA
IE0004063	Poulaphouca Reservoir SPA
IE0004064	Lough Ree SPA
IE0004065	Lough Sheelin SPA
IE0004066	The Bull and The Cow Rocks SPA
IE0004068	Inishmurray SPA
IE0004069	Lambay Island SPA
IE0004072	Stags of Broad Haven SPA
IE0004073	Tory Island SPA
IE0004074	Illanmaster SPA
IE0004075	Lough Swilly SPA
IE0004076	Wexford Harbour and Slobs SPA
IE0004077	River Shannon and River Fergus Estuaries SPA
IE0004078	Carlingford Lough SPA
IE0004080	Boyne Estuary SPA
IE0004081	Clonakilty Bay SPA
IE0004082	Greers Isle SPA
IE0004083	Inishbofin, Inishdooney and Inishbeg SPA
IE0004084	Inishglora and Inishkeeragh SPA
IE0004086	River Little Brosna Callows SPA
IE0004087	Lough Foyle SPA
IE0004089	Rahasane Turlough SPA
IE0004090	Sheskinmore Lough SPA
IE0004091	Stabannan-Braganstown SPA
IE0004092	Tacumshin Lake SPA
IE0004093	Termoncarragh Lake and Annagh Machair SPA
IE0004094	Blackwater Callows SPA
IE0004095	Kilcolman Bog SPA
IE0004096	Middle Shannon Callows SPA
IE0004097	River Suck Callows SPA
IE0004098	Owenduff/Nephin Complex SPA
IE0004099	Pettigo Plateau Nature Reserve SPA
IE0004100	Inishtrahull SPA
IE0004101	Ballykenny-Fisherstown Bog SPA

Pre-Consultation NIS

Site Code	Site Name
IE0004102	Garriskil Bog SPA
IE0004103	All Saints Bog SPA
IE0004105	Bellanagare Bog SPA
IE0004107	Coole-Garryland SPA
IE0004108	Eirk Bog SPA
IE0004109	The Gearagh SPA
IE0004110	Lough Nillan Bog SPA
IE0004111	Duvillaun Islands SPA
IE0004113	Howth Head Coast SPA
IE0004114	Illaunonearaun SPA
IE0004115	Inishduff SPA
IE0004116	Inishkeel SPA
IE0004117	Ireland's Eye SPA
IE0004118	Keeragh Islands SPA
IE0004119	Loop Head SPA
IE0004120	Rathlin O'Birne Island SPA
IE0004121	Roaninish SPA
IE0004122	Skerries Islands SPA
IE0004124	Sovereign Islands SPA
IE0004125	Magharee Islands SPA
IE0004127	Wicklow Head SPA
IE0004129	Ballysadare Bay SPA
IE0004132	Illancrone and Inishkeeragh SPA
IE0004133	Aughris Head SPA
IE0004134	Lough Rea SPA
IE0004135	Ardboline Island and Horse Island SPA
IE0004136	Clare Island SPA
IE0004137	Dovegrove Callows SPA
IE0004139	Lough Croan Turlough SPA
IE0004140	Four Roads Turlough SPA
IE0004142	Cregganna Marsh SPA
IE0004143	Cahore Marshes SPA
IE0004144	High Island, Inishshark and Davillaun SPA
IE0004145	Durnesh Lough SPA
IE0004146	Malin Head SPA
IE0004148	Fanad Head SPA
IE0004149	Falcarragh to Meenlaragh SPA
IE0004150	West Donegal Coast SPA
IE0004151	Donegal Bay SPA
IE0004152	Inishmore SPA
IE0004153	Dingle Peninsula SPA
IE0004154	Iveragh Peninsula SPA
IE0004155	Beara Peninsula SPA
IE0004156	Sheep's Head to Toe Head SPA

Pre-Consultation NIS

Site Code	Site Name
IE0004158	River Nanny Estuary and Shore SPA
IE0004159	Slyne Head to Ardmore Point Islands SPA
IE0004160	Slieve Bloom Mountains SPA
IE0004161	Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA
IE0004162	Mullaghanish to Musheramore Mountains SPA
IE0004165	Slievefelim to Silvermines Mountains SPA
IE0004167	Slieve Beagh SPA
IE0004168	Slieve Aughty Mountains SPA
IE0004170	Cruagh Island SPA
IE0004172	Dalkey Islands SPA
IE0004175	Deenish Island and Scariff Island SPA
IE0004177	Bills Rocks SPA
IE0004181	Connemara Bog Complex SPA
IE0004182	Mid-Clare Coast SPA
IE0004186	The Murrough SPA
IE0004187	Sligo/Leitrim Uplands SPA
IE0004188	Tralee Bay Complex SPA
IE0004189	Kerry Head SPA
IE0004190	Galley Head to Duneen Point SPA
IE0004191	Seven Heads SPA
IE0004192	Helvick Head to Ballyquin SPA
IE0004193	Mid-Waterford Coast SPA
IE0004194	Horn Head to Fanad Head SPA
IE0004212	Cross Lough (Killadoon) SPA
IE0004219	Courtmacsherry Bay SPA
IE0004220	Corofin Wetlands SPA
IE0004221	Illaunnaon SPA
IE0004227	Mullet Peninsula SPA
IE0004228	Lough Conn and Lough Cullin SPA
IE0004230	West Donegal Islands SPA
IE0004231	Inishbofin, Omey Island and Turbot Island SPA
IE0004232	River Boyne and River Blackwater SPA
IE0004233	River Nore SPA
IE0004234	Ballintemple and Ballygilgan SPA
IE0004235	Doogort Machair SPA
IE0004236	North-west Irish Sea SPA
IE0004237	Seas off Wexford SPA

Source: NPWS data sheets. Available at: <https://www.npws.ie/maps-and-data/designated-site-data/sac-and-spa-datasheets-downloads> [Accessed 18/03/2026].



Appendix D List of Former SACs in Northern Ireland

Pre-Consultation NIS

ApX Table 5: List of former SACs in Northern Ireland.

Site Code	Site Name
UK0030055	Rathlin Island
UK0030224	North Antrim Coast
UK0016613	Magilligan
UK0030084	Bann Estuary
UK0030097	Breen Wood
UK0030089	Binevenagh
UK0016610	Garry Bog
UK0030199	Main Valley Bogs
UK0016606	Garron Plateau
UK0030303	Wolf Island Bog
UK0030083	Banagher Glen
UK0030110	Carn-Glenshane Pass
UK0016599	Ballynahone Bog
UK0016608	Teal Lough
UK0030211	Moneygal Bog
UK0030244	Rea's Wood and Farr's Bay
UK0030233	Owenkillew River
UK0016609	Black Bog
UK0030296	Upper Ballinderry River
UK0016611	Fairy Water Bogs
UK0030214	Montiaghs Moss
UK0016607	Pettigoe Plateau
UK0030236	Peatlands Park
UK0030045	Largalinny
UK0016619	Monawilkin
UK0030047	Lough Melvin
UK0030291	Turmennan
UK0030068	Fardrum and Roosky Turloughs
UK0030300	West Fermanagh Scarplands
UK0030169	Hollymount
UK0016618	Strangford Lough
UK0016622	Slieve Beagh
UK0030180	Lecale Fens
UK0030116	Cladagh (Swanlinbar) River
UK0016603	Cuilcagh Mountain
UK0016621	Magheraveely Marl Loughs
UK0016620	Derryleckagh
UK0016612	Murlough
UK0016615	Eastern Mournes
UK0030212	Moninea Bog
UK0016614	Upper Lough Erne
UK0030277	Slieve Gullion
UK0030268	Rostrevor Wood
UK0030319	Ballykilbeg

Pre-Consultation NIS

Site Code	Site Name
UK0030318	Aughnadarragh Lough
UK0030325	Tonnagh Beg Bog
UK0030321	Cranny Bogs
UK0030324	Deroran Bog
UK0030326	Tully Bog
UK0030323	Dead Island Bog
UK0030322	Curran Bog
UK0030320	River Foyle and Tributaries
UK0030361	River Faughan and Tributaries
UK0030360	River Roe and Tributaries
UK0030365	Red Bay
UK0030383	Skerries and Causeway
UK0030384	The Maidens
UK0030399	North Channel

Source: JNCC Datasheet. Available at: <https://sac.jncc.gov.uk/site/northern-ireland> [Accessed March 2026].



Appendix E List of Former SPAs in Northern Ireland

Pre-Consultation NIS

Apx Table 6: List of former SPAs in Northern Ireland.

Site Code	Site Name
UK9020101	Belfast Lough
UK9020042	Larne Lough
UK9020091	Lough Neagh and Lough Beg
UK9020051	Pettigoe Plateau
UK9020021	Sheep Island
UK9020111	Strangford Lough
UK9020071	Upper Lough Erne
UK9020011	Rathlin Island
UK9020031	Lough Foyle
UK9020221	Killough Bay
UK9020161	Carlingford Lough
UK9020271	Outer Ards
UK9020301	Antrim Hills
UK9020302	Slieve Beagh-Mullaghfad-Lisnaskea
UK9020290	Belfast Lough Open Water
UK9020291	Copeland Islands

Source: JNCC Datasheet. Available at: <https://jncc.gov.uk/our-work/list-of-spas/#northern-ireland> (Accessed March 2026)