

AGRI-FOOD STRATEGY 2025

STRATEGIC ENVIRONMENTAL ASSESSMENT ISSUES PAPER

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1. Introduction

Article 9 of the European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations 2004, transposing the EU Directive 2001/42/EC, requires the assessment of certain plans and programmes. As part of this requirement, screening for Strategic Environmental Assessment (SEA) must be carried out to determine if a plan/programme has the potential, if unmitigated, to result in significant adverse environmental effects. SEA *screening* determined that the implementation of the Agri-Food Strategy 2025 provides a framework for future projects that may potentially result in significant environmental effects. As a result, SEA is being undertaken for the Agri-Food Strategy 2025 currently in preparation by the Department of Agriculture, Food and the Marine (DAFM) in association with industry representatives. The SEA provides an opportunity to identify and address potential impacts at source rather than rely on an existing framework of mitigation measures to address novel/additional problems.

The purpose of this *Issues Paper* is to inform the *scoping* stage of the Strategic Environmental Assessment process. It sets the framework for defining the scope of the environmental issues to be dealt with by the SEA, together with the level of assessment detail required.

1.1. The SEA Requirements and Context

The SEA process aims to inform the drafting of the Strategy through the early identification of any potential for significant effects on: human beings (population and health); biodiversity, flora and fauna; water; air quality and climatic factors; soils and geology; landscape; cultural heritage (including archaeological and architectural heritage); and material assets. The assessment of potential for significant effects will also look at inter-relationships between the above environmental factors. As far as possible, the potential for cumulative effects both with regards to the combined environmental sensitivity of the receiving environment and to the collective effects resulting from the various sectoral activities will also be examined in the SEA.

1.2. SEA and Appropriate Assessment

Under Article 6 of the Habitats Directive it is a requirement that plans and programmes undergo Appropriate Assessment (AA) screening to establish the potential for adversely affecting Natura 2000 ('European') sites. Agri-Food Strategy 2025 is currently undergoing AA in parallel with SEA (Figure 1). Both assessments are closely interlinked - as demonstrated within the Integrated Biodiversity Impact Assessment Framework - IBIA (EPA, 2013a), which is being followed. The AA findings will inform SEA, while SEA informs the AA process with regards to wider biodiversity issues and monitoring measures, amongst other things. The statutory period for consultation during the SEA scoping stage will accommodate any submissions on AA, as well as facilitating engagement with the National Parks and Wildlife Service (NPWS).

Refer to the AA Policy Guidance Note document for further detail on key Natura 2000 considerations to be 'scoped in' when drafting and assessing the Agri-Food Strategy 2025.

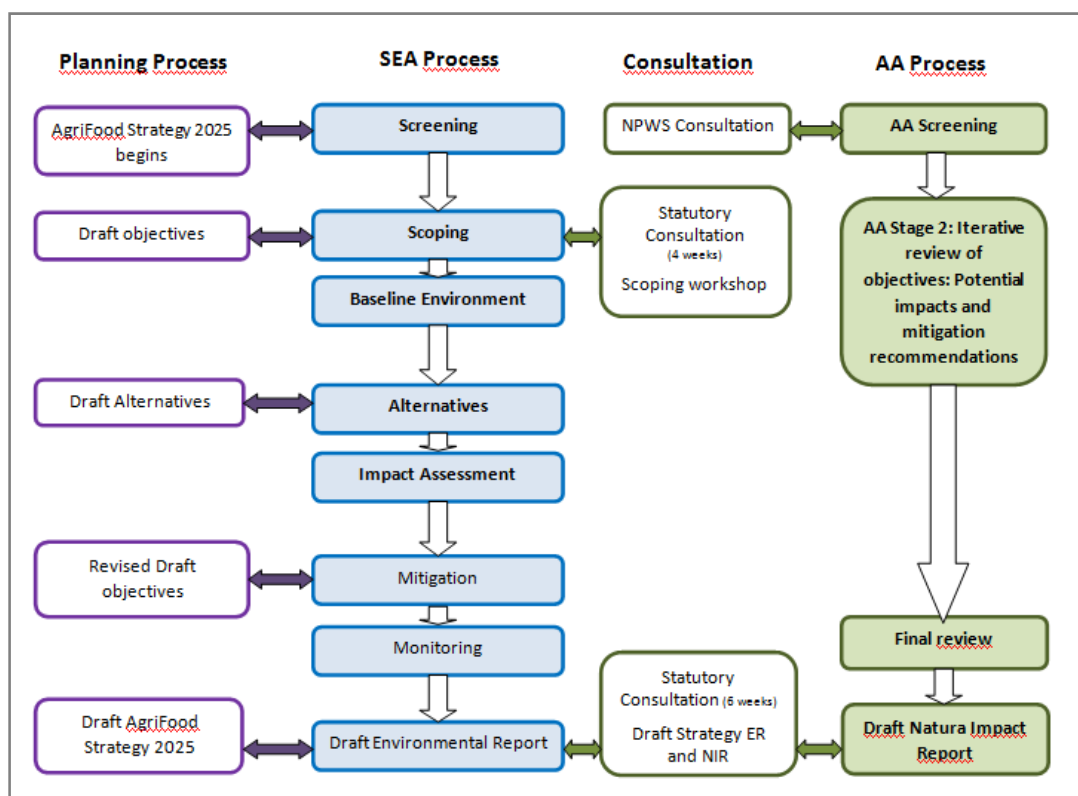


Figure 1. Schematic diagram illustrating the interactions between the SEA, AA and drafting of the Agri-Food Strategy 2025.

1.3. Expected AA and SEA Outcomes

The objective of SEA is to inform the drafting of the Agri-Food Strategy 2025 through early identification of potential conflicts between the Strategy's draft objectives/targets on the one hand and environmental protection objectives on the other. In contrast, the main aim of AA is to protect Natura 2000 sites and, in doing so, identify any potential conflicts between the achievement of the Strategy's targets and the conservation of the integrity of sites. There is a high burden of proof placed on AA and all the Strategy's objectives/targets must demonstrate that no adverse effects will occur on the Natura 2000 network. In both AA and SEA, the potential outcomes are as follows:

1. Iterative review of the Strategy's objectives and targets in order to assess the potential for significant adverse effects and ongoing communication with the Strategy Team for timely addressing of any identified conflicts.
2. Refinement of the Strategy's objectives and targets. If potential for significant adverse effects is identified, mitigation measures will be put in place to remedy or reduce those by means of amendments to the proposed draft objectives/targets, or by including new targets.
3. Setting up a monitoring programme to ensure follow-up on the implementation of the Strategy and identify appropriate remedial actions if adverse environmental changes are identified.
4. Draft SEA Environmental Report and Draft Natura Impact Report to accompany the Draft Strategy during consultation (i.e. before adoption). An SEA statement will also be included in the final Strategy outlining how environmental considerations have been incorporated into its objectives and targets.

1.4. The Overarching Theme of Strategy 2025

Food Harvest 2020 offered the vision of Smart Green Growth for the Irish agri-food sector (DAFM, 2010), and there is a strong consensus within the proposals and commentary reviewed to date from industry, professional and environmental groups that Strategy 2025 should deliver on this through what one submission termed 'sustainable competitiveness' (Agri-Food Strategy Group submission) - i.e. that sustainability is the tenet on which the Strategy must be built. This would couple 'Brand Name Ireland' with 'strict ethical values' to deliver 'quality product(s) that cannot be surpassed' (Irish Country Markets submission). This consensus is laudable in being promoted from within the agri-food industry, but there will be practical and communication difficulties in delivering it, and these should be addressed up-front. Careful use of terminology can both improve public optics and establish positive two-way sub-conscious messages: for example, allusions to 'maximising' production should be avoided in favour of terminology referring to 'optimisation', which is more closely related to the inherent limitations imposed by the concept of sustainability. Use of the phrase 'sustainable intensification' would also be problematic since intensification (akin to 'acceleration') is not something that can be 'sustained' (i.e. maintained indefinitely).

Much of the emphasis will be on Ireland's competitive position in supplying products to the expanding global food market and thereby contributing to European food security. However, the terminology adopted in relation to this ambition should be honest and not suggest that Irish value-added products could directly offset third-world food shortages. At the same time, it should be recognised that not all up-coming market opportunities lie in export - or will be targeting exports for their expansion (e.g. craft brewing), and that an import-substitution expansion of the domestic fruit and vegetable sector, in particular, would do much to address national food security.

Amongst other things, the term 'sustainable' indicates that the actions will be compliant across the full swathe of legislation, and will be achieved within the carrying capacity of the environment (JCAFM, 2014). As BirdWatch Ireland note, "environment protection should be seen as a prerequisite for the sector in Ireland, rather than a challenge to overcome" - because lack of an evidence base for sustainability will erode 'Brand Name Ireland'¹. To help ensure the latter, all actions will have to be tested for potential environmental effects, and thereafter re-examined to maximise benefits and eliminate/minimise negative effects. Mitigation measures will be required to address negative effects that cannot be 'designed-out', and these have to have appropriate objectives/targets, be plausible, and be tried and tested in their ability to deliver². Furthermore, the 'polluter pays' principle implies that mitigation of agri-food industry proposals should be sectorally funded rather than devolve to the public purse.

SEA legislation specifically requires that actions resulting from the plan/programme in question should be monitored, and that remedial action should be taken in the event that any significant deterioration is identified. Therefore, any proposed monitoring measures should be realistic, and capable of being applied throughout the affected sub-sector; simple reliance on voluntary schemes, or schemes intended for another purpose, will not be sufficient in isolation.

¹ An Bord Bia similarly argue that sustainability is key to the brand agenda.

² As has already been stated even more forcefully in the equivalent Policy Guidance Note generated at this stage of the Appropriate Assessment (PGN: Section 2.7).

1.5. Consultation

Consultation with designated environmental authorities is a requirement under SEA. Although consultation is not a mandatory requirement under AA, consultation with NPWS is best practice. In addition, ongoing communication with the Strategy Team is necessary to ensure that any relevant information on the potential for environmental effects is communicated and accordingly incorporated in the drafting of the objectives/targets. In order to ensure an effective and meaningful consultation, the SEA and AA Teams have devised a communication plan as illustrated in Table 1 below.

Communication Action	Date	Deliverable
SEA and AA Teams meet	03/03/2015	SEA/AA timetables and requirements drafted for circulation to DAFM
SEA and AA Teams meet with DAFM	05/03/2015	Sectoral meetings scheduled
SEA and AA Teams meet with the Strategy's Steering Committee	11/03/2015	Introduction to SEA/AA context, timeframes and requirements
Strategy	20/03/2015	Draft Strategy Objectives
SEA and AA Teams meet with Seafood Subgroup	20/03/2015	Introduction to SEA/AA and preliminary identification of potential impacts for the Seafood sector
SEA and AA Teams meet with the Environment, Forestry and Climate Change Subgroup	20/03/2015	Introduction to SEA/AA and preliminary identification of potential impacts for the Forestry sector
SEA and AA Teams meet with the Meat and Cereals Subgroup	23/03/2015	Introduction to SEA/AA and preliminary identification of potential impacts for the Meat and Cereals sectors
SEA and AA Teams meet with the Milk and Infant Formulae Subgroup	23/03/2015	Introduction to SEA/AA and preliminary identification of potential impacts for the Milk and Infant Formulae sectors
SEA and AA Teams meet with the Beverages, Prepared Consumer Foods and Horticulture Subgroup	25/03/2015	Introduction to SEA/AA and preliminary identification of potential impacts for the Beverages, Horticulture and Retailer sectors
AA Team informs the preparation of the Strategy to avoid adverse impacts on the Natura 2000 network	27/03/2015	Draft Policy Guidance Note
Strategy Team revises the Draft Policy Guidance Note	01/04/2015	Comments on the Policy Guidance Note
SEA Team informs the preparation of the Strategy to avoid significant adverse effects on the environment	02/04/2015	Draft SEA Issues Paper
Strategy Team revises the Draft SEA Issues Paper	06/04/2015	Comments on the Draft SEA Issues Paper
SEA and AA Teams consult the Strategy Team and key stakeholders on the scope of assessments	09/04/2015	Scoping Workshop
The Issues Paper and the Draft Strategy Objectives are subject to mandatory consultation	09/04/2015 to 07/05/2015	Scoping consultation

Table 1. Communication plan for the SEA and AA processes.

Communication Action	Date	Deliverable
Strategy Team provides specific sectoral targets and alternatives for assessment to the SEA and AA Teams	30/04/2015	Sectoral targets and alternatives
SEA Team prepares the Scoping Report taking into account consultation feedback and draft targets- to form the basis of the draft Environmental Report	14/05/2015	Scoping Report
SEA and AA Teams assess targets and alternatives and communicate potential issues to Strategy Team to devise and discuss mitigation	22/05/2015	Proposed mitigation measures
SEA and AA Teams workshop with the Strategy Team to devise and discuss mitigation (i.e. amendments to the Strategy)	27/05/2015	
SEA and AA Teams assess revised targets and alternatives (iteration)	05/06/2015	Draft SEA Environmental Report (ER) and Draft Natura Impact Report (NIR)
The Draft SEA ER and Draft NIR together with the Draft Strategy are subject to mandatory consultation	01/07/2015 to 26/08/2015	Public consultation

Table 1. Communication plan for the SEA and AA processes (cont.).

1.6. Legislative Framework

The SEA and AA processes will ensure compliance with the following legislation:

- The SEA Directive 2001/42/EC on the assessment of certain plans and programmes on the environment (CEC, 2001);
- The Habitats Directive on the conservation of natural habitats and of wild fauna and flora (CEC, 1992);
- The Birds Directive on the conservation of wild birds (EC, 2009);
- The European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations 2004 (Statutory Instrument Number - SI No. 435 of 2004);
- The European Communities (Environmental Assessment of Certain Plans and Programmes) (Amendment) Regulations 2011 (SI No. 200 of 2011);
- The Planning and Development Acts 2000 to 2011;
- The European Communities (Birds and Natural Habitats) Regulations (DAHG, 2011); and
- Environmental Liability Directive (EC, 2004).

In addition to complying with the legislation, the processes will be undertaken taking into account international and national guidance:

- Implementation of SEA Directive (2001/42/EC): Guidelines for Regional Authorities and Planning Authorities (DEHLG, 2004);
- Appropriate Assessment of Plans and Projects in Ireland. Guidance for Planning Authorities (DEHLG, 2009);

- 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, (DG Environment, 2002);
- Managing Natura 2000 sites: The Provisions of Article 6 of the Habitats Directive 92/43/EEC (EC, 2000);
- Guidance on Integrating Climate Change and Biodiversity into Strategic Environmental Assessment (EC, 2013);
- Integrated Biodiversity Impact Assessment – Streamlining AA, SEA and EIA Processes: Practitioner’s Manual (EPA, 2013a);
- EPA GISEA Manual: Current Practice and Potential on the Application of Geographical Information Systems as a Support Tool in Strategic Environmental Assessment of Irish Land Use Plans (EPA, 2009); and
- Good Practice Guidance on SEA Alternatives (EPA, in press).

1.7. Other Relevant Plans and Programmes

When assessing the potential for significant effects on the environment as a result of the Agri-Food Strategy 2025 implementation, the interactions and the potential for cumulative effects deriving from other existing plans and programmes will be taken into consideration. These include:

- Food Harvest 2020 (DAFM, 2010);
- Draft Forestry Programme 2014-2020 (DAFM, 2014a); and
- Draft Seafood Development Programme 2020 (DAFM, 2015).

2. Agri-Food Strategy 2025 Draft Objectives

The Irish Agri-Food industry, facilitated by DAFM, is currently developing a national strategy for the Agri-Food Sector up to 2025 which will outline the key actions required to ensure that the sector (primary agriculture, the food and beverage industry, fisheries and fish processing, forestry and forestry processing) maximises its contribution to national economic growth, job creation and environmental sustainability over the coming decade and builds upon the progress achieved under Food Harvest 2020. This Strategy is being developed by a Committee of leading figures from the agri-food sector.

The agri-food sector continues to play an integral part in Ireland's economic recovery and is our largest indigenous industry, contributing over €26 billion in turnover and generating 12.7% of merchandise exports. The sector accounts for around 170,000 jobs or 9% of total employment, and makes a particularly significant contribution to employment in rural areas. Food & Beverage exports increased to a record value of €10.45 billion in 2014 representing an increase of 4% on the previous year and a 45% increase since 2009.

The Agri-Food Strategy 2025 will propose growth targets aimed at optimising the potential economic contribution of the sector, support employment and the creation and retention of jobs in rural areas, whilst at the same time recognising the need for delivery on national and international environmental objectives.

As part of this Strategy development, the Department has commissioned an Environmental Analysis (incorporating a SEA and an AA) and are seeking the views of stakeholders, through public consultation, on the areas to be considered under this Analysis.

As a 'high level' strategy, it is envisaged that the SEA should consider a number of scenarios including a range of potential volume and value targets. These targets will be achieved through environmentally sustainable intensification of production which will underpin future growth in the sector while managing through avoiding and where necessary mitigating potential impacts on the environment, including natural resources.

The analysis should show how Ireland can develop economically, socially and environmentally sustainable agri-food production and processing systems across all enterprises, in order to support profitability, maintain international competitiveness and contribute to enhancing the quality of our environment. Our goal is to aim to meet, and indeed surpass, national and international environmental sustainability standards.

It is expected that the Strategy will contribute to the more efficient use of resources in the agri-food sector, increasing productivity and profitability while at the same time mitigating potential negative impacts on the environment, including those on climate change, water quality, land, soils and biodiversity. The Strategy should provide Ireland's agri-food sector with a road map towards gaining real competitive advantage on international markets through the protection of Ireland's natural ecosystems and ensuring strict compliance with both national and international environmental legislation.

The Strategy will have a strong focus on value addition as a key driver of growth, through increased innovation and application of precision technology all along the supply chain leading to

improvements in productivity in a sustainable manner. The actions will seek to maximise the value of outputs across both primary and processing sectors while minimising input requirements through the pursuit of greater efficiency improvements and development and application of innovative processes and modern technological advances.

2.1. Sectoral Draft Objectives

Building on the progress achieved over the past five years, the environmental analysis (incorporating a SEA and an AA) should concentrate on the following:

Dairy

With the abolition of milk quotas on the 31st March this year, the industry is anticipating over 15% growth in output in 2015 and continued expansion and investment thereafter. Initial assessments should consider potential scenarios around this estimation and recommend ways to minimise the impact of dairy expansion, both at a national level but also in particular on local areas with environmental sensitivities including water and ecosystems.

Beef

The Strategy will focus on the optimisation of economic benefits of the beef sector to the economy and its stakeholders with emphasis on maximising Ireland's grass fed comparative advantage in sustainably producing beef and meeting increasing global demand for beef products. Actions will be targeted at maximising the potential contribution of the forecasted increased dairy calvings to the beef sector through the adoption of managed matings with artificial or otherwise beef-type sires and by adding value to existing output; the exploitation of new major markets (USA & China) with very significant growth opportunities (unlike existing EU markets) will assist the sector to achieve improved market returns from all markets in order to optimise producer margins and address the ongoing problem of poor profitability in the sector. These productivity gains will ensure Ireland can leverage its internationally low carbon credentials to service the additional beef demand in a sustainable, efficient manner.

Actions should build on existing research and research already undertaken to underpin sustainable environmental measures. The introduction and application of technological improvements are aimed at maximising productivity per hectare, while at the same time ensuring that production is best geared towards meeting the different market requirements. The increased focus on value addition for beef products is aimed at maximising growth and returns for the sector. The assessment should also give consideration to potential changes in the structure of the beef-producing herd as a result of the significant adjustments expected in dairy production, and the likely environmental impact of such changes. Analysis is needed on adjustments in sustaining the number of processors at a minimum added value.

Pork, Poultry & Sheepmeat

The Strategy will focus on addressing ongoing issues associated with margin erosion due to increases in input costs experienced by producers in recent years. It will recommend the continued development and adoption of efficiency measures at producer level and the need for further new product development and process innovations along the supply chain aimed at growing the value of these sectors up to 2025.

Cereal, Horticulture & Organics

The Strategy will focus on maximising productivity per hectare and the potential for value addition by exploring opportunities such as production of high quality inputs for malting and distilling and New Product Development (NPD) around breakfast cereals, animal feeds, oils and domestic protein production.

Seafood

The Strategy will target sustainable development of the seafood sector and management of marine resources, in particular the need to ensure environmentally sustainable management of wild fish stocks in parallel with environmentally sustainable development of the aquaculture sector. Additional research is needed to assess the vulnerability of fisheries and aquaculture to climate change and to investigate how species and populations adapt to changing marine environments. The analysis should examine the potential increase in Ireland's processing proportion of total catch in Irish waters.

Forestry and Sustainable Land Management

The Strategy will support the implementation of the current Forestry Strategy including achievement of revised planting targets. The Strategy will advance environmentally sustainable land management practice and include assessment of changes to land use, soil quality and carbon stocks. Please note that the 2025 Committee has not yet considered the scale of likely growth in the sector.

2.2. Implications

The sectoral draft objectives described in Section 2.1 are summarised in Table 2 with regards to the anticipated trajectories and trends in the relevant sectors. Overall, continued economic growth is anticipated in all sectors; in some cases through intensification and in others through new product development or increasing product value.

Sector	Anticipated Trajectory/Trend to 2025
Dairy	Continued expansion of herd and investment in processing, etc.
Beef	Adjustment of overall herd to counterbalance the dairy herd by absorbing spare male calves and earlier slaughter; maximising productivity per hectare; and increasing value addition for beef products.
Pork, Poultry and Sheepmeat	Continued adoption of efficiency measures to develop new products and increase product value.
Cereal, Horticulture and Organics	Mainly intensification of cultivation (maximising productivity per hectare), developing new products and increasing product value. Re-establishment of sugar beet industry for refined sugar and bioethanol production (Food Harvest 2020 did not include sugar beet production within its scope). Other biofuel production systems.
Seafood	Definition of sustainability in relation to aquaculture projects reliant on imported feed (Food Harvest 2020 did not include aquaculture within its scope).
Forestry and Sustainable Land Management	Continued afforestation initiated by planting under 2014-20 Programme; increased demand for timber processing; possible further planting on peatland sites; increased construction of forest roads.

Table 2. Anticipated sectoral trajectories/trends to 2025.

3. Baseline Environment and Potential Environmental Issues

The following sub-sections provide a general statement on the quality and status of environmental resources, anticipating any potential effects resulting from the implementation of the draft objectives presented in Section 2. The SEA Environmental Report will further analyse these issues in the context of refined objectives and more specific draft targets. In addition to providing further detail, the SEA process will also consider the inter-relationship between environmental factors and the potential for cumulative effects.

3.1. Population and Human Health

Population density is unevenly distributed across the country, with greater concentration of inhabitants in the East and around main urban settlements, and large pockets of sparsely populated areas in the North- and South-West (Figure 2). This has significant implications with regards to the availability of land for agricultural purposes and the working force that may be required to enhance growth in certain sectors. This may lead to increased travel to work journeys in certain parts of the country. It may also result in targeted economic growth of key regions if the sectoral targets are strategically implemented (particularly in the beverages and prepared consumer foods sectors).

Potential Environmental Issues

- Impacts on human health may arise within the dairy, meat and food processing sectors from interactions with environmental vectors such as water - through which contaminants or pollutants can come in contact with human beings (e.g. *Cryptosporidium* outbreaks).
- Nuisances to human health can arise as a result of exposure to soil or water contaminated from incompatible adjacent land-uses.
- Potential zoonotic implications could derive from larger concentrations of animals resulting from increases in herd sizes within the dairy and meat sectors.
- Potential for significant effects on human health are mainly anticipated from the dairy and infant formula sector. These relate to the necessary promotion of formula products, which is in opposition to the World Health Organisation (WHO) recommendations for prolonged breastfeeding.

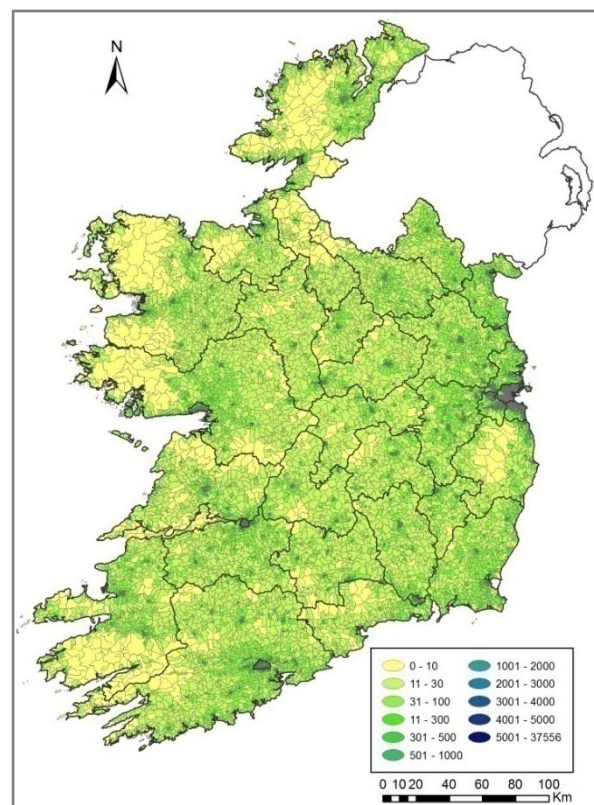


Figure 2. Population density. Data source: CSO, 2011 census.

Data Limitations

Although significant socio-economic data are available from the Central Statistics Office (e.g. census data) and the Economic and Social Research Institute (ESRI), human health data are lacking. Some

information can be inferred from other data sources such as air or water quality, but there is a dearth of readily available quantitative and spatially-specific information in this area (e.g. epidemiological data linking environmental pollutants with health impacts in people). These data limitations will affect the full assessment of human health effects at the local level.

3.2. Biodiversity, Flora and Fauna

Figure 3 illustrates the distribution of the Natura 2000 network (i.e. Special Protection Areas - SPAs, and Special Areas of Conservation - SACs) providing an indication of the areas that are most ecologically sensitive to the Strategy. These areas are protected under the Habitats and Birds Directives and subject to AA. Specific issues from the various sectors and their interactions with Natura 2000 sites and protected species under Annex II of the Habitats Directive are described in the AA Policy Guidance Note.

Figure 4 presents other ecological designations (i.e. wildlife sites designated under the Wildlife Act) and areas of biodiversity importance (e.g. peat bogs, broad leaved forests and natural grasslands listed in Annex I of the Habitats Directive) - many of which are already designated for protection. On a national level, ecological sensitivities occur in greatest concentrations in the Western seaboard. Additional biodiversity, flora and fauna considerations, including salmonid waters, freshwater pearl mussel (*Margaritifera margaritifera*) catchments and shellfish waters will be also examined in the SEA. These and other species inter-relate with water and, as such, may be affected by deterioration in water quality. Data sources will include the NPWS and the National Biodiversity Data Centre (NBDC).

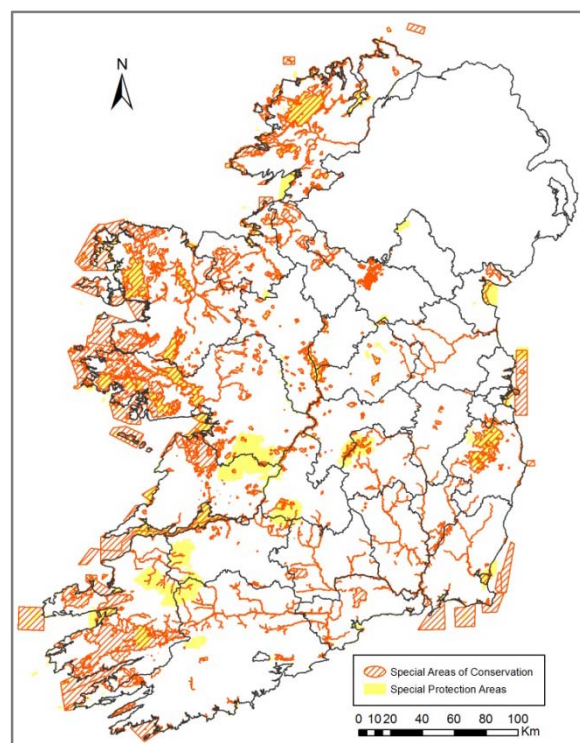


Figure 3. Natura 2000 network. Data source: NPWS, 2015.

Retention of semi-natural habitat is recognised as part of Ireland's competitive marketing advantage, but this will depend upon quantified evidence from appropriate monitoring to ensure ecosystem services can be delivered at the appropriate field, farm, or landscape scale (e.g. ASA submission).

Potential for significant impacts on broader biodiversity are anticipated from a number of sectors, associated to key activities such as agricultural intensification (or abandonment), afforestation and the development of on-shore aquaculture installations. Biodiversity interacts with a number of environmental factors (such as water quality, climate change or soils) and, as such, will be influenced by these in addition to the sectoral pressures discussed below.

Potential Environmental Issues

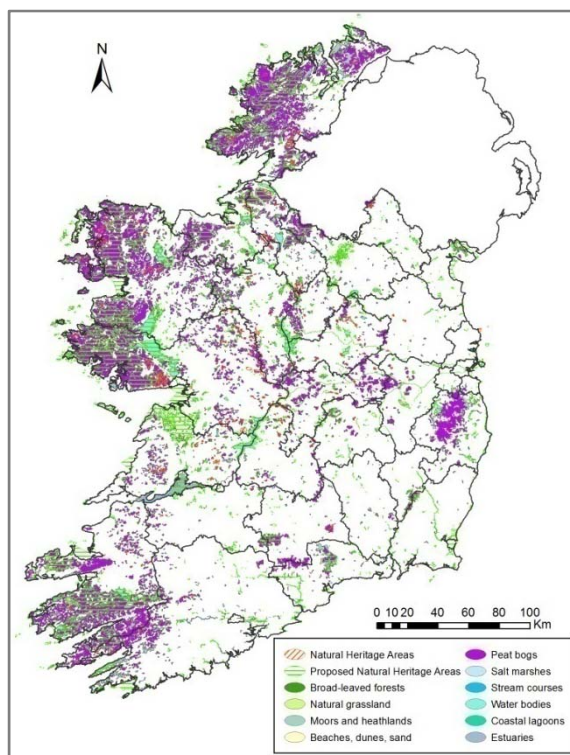
- The dairy sector is likely to result in flora and fauna effects from intensification, with higher volumes of manure to be managed, and increased use of fertilisers, herbicides and pesticides.

Nutrient management will be a particularly significant issue for the dairy and meat sectors given that approximately 90% of farmland in Ireland is used for livestock (DAFM, 2014b). This and other potential effects on water quality (see Section 3.4 for further detail) can negatively influence both aquatic and terrestrial biodiversity. Similarly, grazing patterns from livestock (i.e. associated with both the dairy and meat sectors) have the potential to alter habitat structure and function.

- In the meat and cereal sectors, effects will be associated to increased herd and crop production resulting, amongst other things, in increased use of pesticides; harm from pesticides is likely to be particularly relevant to invertebrates and wild birds. Other direct effects can also be anticipated, such as direct biodiversity loss in the context of increased use of monocultures and hedgerow removal.
- Similar effects on biodiversity, to those of the cereal sector, are anticipated from the forestry sector if non-native monocultures continue to be promoted.
- Potential effects from the seafood sector can be associated to degradation of local habitats resulting from alterations of nutrient balance and waste, as well of flora and fauna deriving from altered gene pools, disease, disturbance or invasive species. Impacts from projected exploitation of novel fish stocks and other species new to cultivation have yet to be explored.
- The beverages sector is likely to result in similar effects on flora and fauna as those from the cereal sector given the need for barley/wheat as raw ingredients. This is also the case for the horticulture sector - although in this case, diversification will be pursued (as opposed to intensification and use of monocultures) but biodiversity effects are anticipated for increased use of fertilisers and pesticides.

While applied biology has the potential to create negative environmental impacts, it also constitutes a crucial receiving environment that can be significantly impacted upon by other actions - including crossover effects between sectors and within a sector itself. As applied biology does not appear as a specific receiving environment in the SEA Directive, its susceptibility can probably be best addressed under inter-relationships since applied biological operations constitute an interaction of flora, fauna, soil, air, water, climate, material assets and landscape.

Figure 4. Natural Heritage Areas and other biodiversity rich land-uses (from CORINE). Data sources: NPWS, 2015 and CORINE, 2014.



The Strategy will not only need to comply with the Habitats Directive requirements in protecting the integrity of Natura 2000 sites, but also with other relevant European and national legislation (e.g. Wildlife Act, 2012), as well as the National Biodiversity Action Plan (DAHG, 2011) that builds upon the EU Biodiversity Strategy 2020 (EC, 2011) and seeks to halt biodiversity loss and degradation of ecosystems and, more importantly, recover it by 2020. The EPA State of the Environment Report

2012 also highlights the need to protect biodiversity and nature from further loss and damage (EPA, 2012). In this context, regulatory measures must be put in place before intensification activities are implemented in order to ensure favourable conservation status (beyond reasonable doubt) of designated sites, and the protection of wider biodiversity (e.g. maximising agricultural areas under biodiversity-related measures under the Common Agricultural Policy - CAP, defining 'green' criteria or integrating biodiversity monitoring under the Common Fisheries Policy - CFP).

Data Limitations

The 'Ireland's Biodiversity in 2010: Knowledge Gaps' report (NBDC, 2010) concludes that Ireland's biodiversity has yet to be fully documented. A small number of groups (e.g. vascular plants, birds, mammals and some invertebrates such as butterflies and molluscs) are well-studied, but significant data and information gaps remain for the large majority of species, and a national habitat map is yet to be prepared. These data limitations will affect the full assessment of effects at the local level.

3.3. Air Quality and Climatic Factors

A number of atmospheric pollutants are measured by the EPA in order to monitor compliance with European ambient air quality directives (e.g. EP & CEU, 2008). These are measured for the four zones defined in the Air Quality Standards Regulations 2002 (SI No. 271 of 2002) as illustrated in Figure 5. The Air Quality in Ireland report (EPA, 2013b) identifies that air quality in Ireland continues to be good and is among the best in Europe.

The agricultural sector accounts for 98% of ammonia (NH₃) emissions in Ireland (DAFM, 2014b), which mainly derive from livestock, but also fertiliser application. According to the EPA³, ammonia emissions are well within the required EU emission limits. These are set at 116 kilotonnes (kt) by 2010 under the National Emission Ceilings Directive (EC, 2001). Nevertheless, given the strong performance and increasing trend of the dairy, meat and agriculture sectors anticipated within the Strategy, limiting ammonia emissions to below the 2010 ceiling in the future could become an issue - as already identified in the environmental assessment of Food Harvest 2020 (DAFM, 2014b).

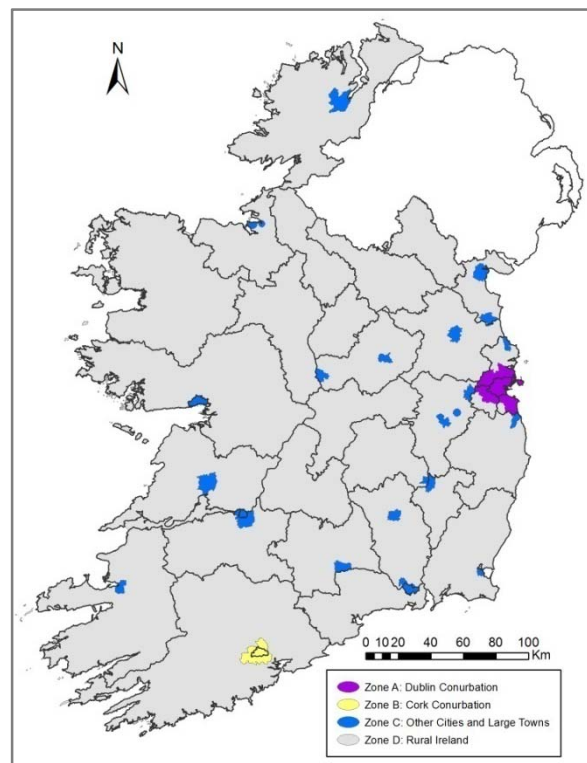


Figure 5. Air Quality Zones. Data source: EPA, 2009.

Nitrous oxide (NO_x) emissions have significantly reduced in the last decade and are well below the national emission ceiling for NO_x of 65 kilotonnes (kt). The industry, agriculture, forestry and fisheries sectors combined account for 10% of NO_x emissions and no significant increase is anticipated as a result of the Strategy.

³ <http://www.epa.ie/newsandevents/news/previous/2013/name,51293,en.html#.VRmQrk0cTIU>

The greatest challenge to Agri-Food Strategy 2025 will undoubtedly be the question of Greenhouse Gas (GHG) emissions. It is recognised that the agricultural sector is the biggest contributor the GHG emissions in Ireland. In their submission, An Taisce points out that the agricultural sector accounts for 32% of all emissions in Ireland. Methane (CH₄) from livestock digestion and manure, and nitrous oxide (N₂O) from spreading of manure and fertilisers into soils make up the bulk of agricultural GHG emissions.

Agriculture emissions were 2.6% higher (0.48 Mt CO₂eq) in 2013 compared with 2012 levels (EPA, 2013c). The EPA reports that the most significant driver for such an increase in emissions was the increased use of synthetic fertiliser by 19.1%, followed by a 2.2% increase in cattle numbers, and a 1.5% increase in sheep numbers. Emission projections suggest a 12% increase in agricultural emissions by 2020 as result of Food Harvest 2020 (Teagasc, 2013). The Irish Government has committed to carbon neutral agriculture by 2050 (with ambitious reduction targets of 42-49%) and, therefore, "the scope of ambition must be within EU emissions targets already agreed to by Ireland" (An Taisce submission) in order to ensure sustainable agricultural development within the broader international GHG obligations (i.e. Kyoto Protocol), and to avoid EU fines for failing to meet agreed emissions targets. Although a strong case can be made that Irish agriculture is the most carbon-efficient in the EU, the current regulatory framework seeks to limit agricultural GHG emissions, and recent research that could inform EU policy-making actually suggests that they should be reduced (Fellman, 2015).

Potential Environmental Issues

- The anticipated increase in animal numbers within the dairy sector in particular but also within the meat sector, cannot be considered sustainable intensification in relation to GHG emissions. Increased methane and NO_x emissions will lead to an overall increase in GHG emissions from the Strategy unless such emissions are offset elsewhere in the Strategy (e.g. investing in sustainably managed carbon sequestration in peatlands and forestry).

The National Climate Change Strategy aims at reducing annual CO₂ by 1 Mt, while the White Paper 'Delivering a sustainable energy future for Ireland' (DCMNR, 2007) sets a target of 33% energy savings by 2020. Therefore, climate adaptation measures regarding the use of renewable energy, etc. should be incorporated in Strategy 2025 (DECLG submission) since the agri-food sector has the potential to contribute to this. More than one submission argues for the rationalisation of bioenergy crop utilisation, and support for the development of biodigestion (Irish Country Markets; Farmgas Community Partners) - and this might provide some mitigation or offset for emissions from an increased herd size. Any reliance on carbon sequestration by increased afforestation would have to be dependent upon evidence that the proposed plantings were indeed better than carbon neutral. There is additional potential for carbon sequestration by conserving peatlands, and in hedgerow maintenance and pasture management (Agri-Food Strategy Group submission) if and when their contribution to carbon budgeting is officially recognised. Furthermore, all objectives and targets should be examined in the light of their ability to maintain sustainability under projected climate change scenarios for Ireland, at least for the duration of the Strategy (for example, wetter summers may lead to higher than predicted pesticide use).

Data Limitations

Air quality in relation to a number of pollutants (e.g. NH_3 , NO_x , PM_{10}) is regularly monitored by the EPA at specific locations throughout the country. Similarly, under international and European agreements, GHG emissions are annually reported by the EPA. Nevertheless, much of these data are collated at national level (extrapolated from point and diffuse sources) and, as a result, examination of any localised effects resulting from specific activities is not possible. The overall contribution of agricultural intensification to national air pollutant levels and GHG emissions will have to be modelled in subsequent implementation plans.

3.4. Water

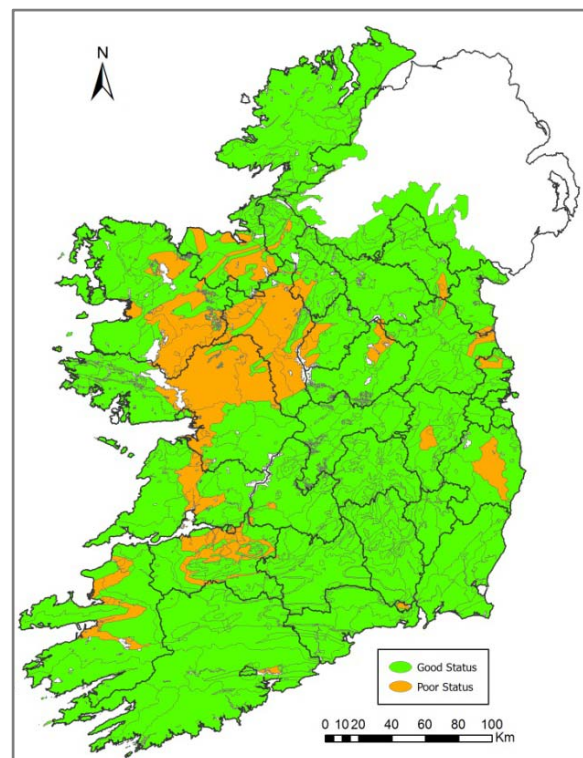
The Strategy must comply with the Water Framework Directive (WFD - EC, 2000) and the Nitrates Directive (EEC, 1991) requirements. The WFD requires the implementation of measures to prevent deterioration of the status of surface waters (i.e. streams, rivers, lakes, transitional and coastal water bodies) and groundwater. More importantly, the WFD requires drawing up River Basin District Management Plans (RBDMP) for the practical implementation of measures to protect, enhance and restore all waters with the aim of achieving good status by 2015. All public bodies are required to coordinate their policies and operations so as to maintain the good status of water bodies that are currently unpolluted and improve polluted water bodies to good status by 2015. Therefore, Agri-Food Strategy 2025 must satisfy the objectives of RBDMPs and thereby include clear policies towards the protection of all waters. These comprise all protected areas including drinking, bathing and shellfish waters, nutrient-sensitive areas and protected habitats and species (as per Section 3.2).

The RBDMP identify the Nitrates Regulations (SI 125 of 2011) as the primary legislative tool by which to protect waters against pollution by nitrates from agricultural sources and thereby contribute to achieving agricultural compliance with the WFD.

However, the RBDMPs also state that evidence suggests that they will not be sufficient to fully deliver the requirements of the WFD in some areas of the country and that the need for supplementary measures will arise (DAFM, 2014b).

The EPA's WFD reporting indicates good groundwater quality for most areas (i.e. 86%) in the country with the exception of a number of large patches mainly to the West (Figure 6). Groundwater vulnerability (i.e. the ease with which the groundwater can be contaminated by human activities) illustrated in Figure 7 overlaps with some of these poor groundwater quality areas, and mostly relate to areas where karst limestone prevails.

Figure 6. Groundwater status. Data source: EPA, 2011.



Surface water and groundwater are linked through water flow pathways. Therefore, there will be parallel risks to surface and ground waters in certain areas. Where agricultural intensification may result in higher risk of surface water contamination or eutrophication (e.g. through pesticides or manure), the risk to groundwater can also be expected to be higher - particularly in high permeability soil and karst bedrock areas.

Ireland's Environment Report (EPA, 2012) indicates that the quality of surface waters has improved in the last two decades, with the majority of surface waters (71% of rivers, 47% of lakes and 46% of transitional and coastal waters) being currently classified as unpolluted or as having high/good status (Figure 8). However, meeting the WFD targets is still a challenge. High status waters in particular (such as those containing healthy populations of freshwater pearl mussel) require very high standards of protection. The EPA states that sewage and diffuse agricultural sources (with increasing nutrient and organic matter volumes and associated nitrogen and phosphorous loads released into water bodies) continue to be the main threats to the quality of Ireland's waters⁴.

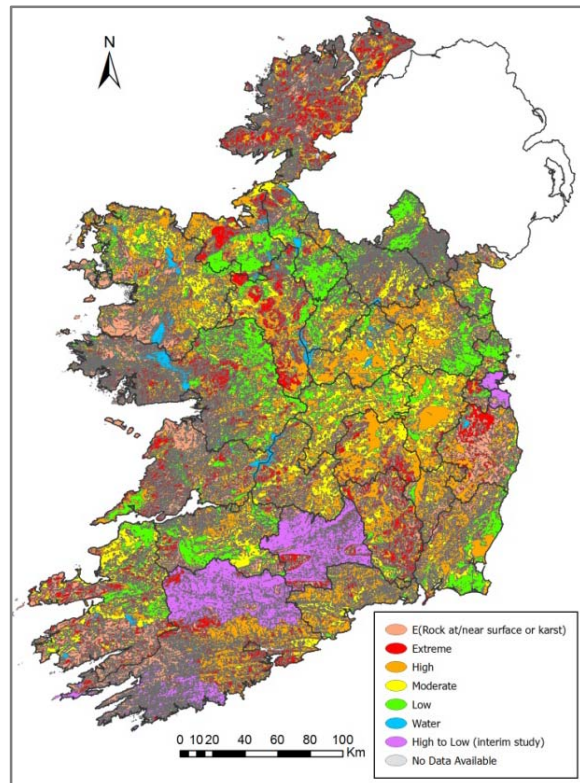


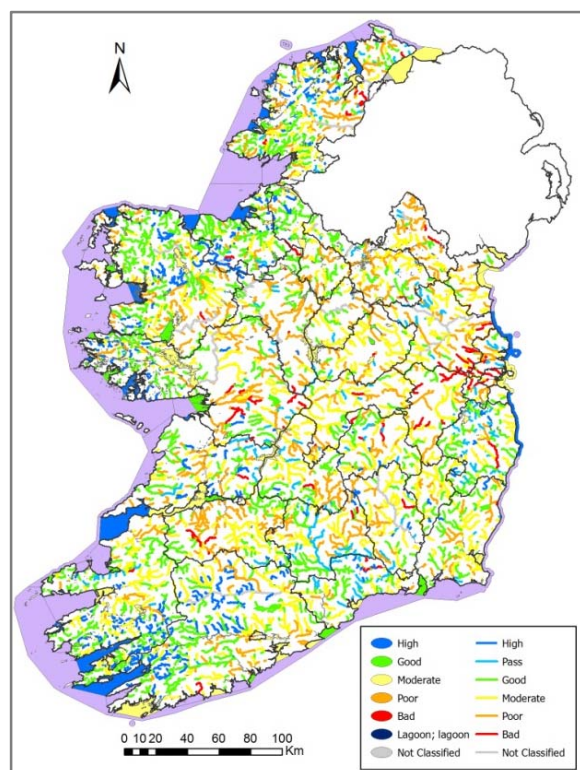
Figure 7. Groundwater vulnerability. Data source: EPA, 2011.

The SEA will further examine baseline water quality using GSI data (e.g. aquifer productivity), the EPA Integrated Water Quality Reports and data on drinking water quality from both the Water Services Authorities and the EPA (2013).

Potential Environmental Issues

- Increased animal waste and ammonia, as well as silage effluent can be anticipated from the meat and cereal sectors. This could result in deterioration of surface waters, and potentially groundwaters, with the risk of water contamination and eutrophication (from fertiliser and sediment run off) having indirect effects on biodiversity, flora and fauna.

Figure 8. Surface water status. Data source: EPA, 2014.



⁴ <http://www.epa.ie/irelandsenvironment/water/#.VRuqe00cTIU>

- Deterioration of surface water quality can also be anticipated from the forestry (as a result of fertiliser run off and siltation), dairy (from increased volume of manures and their management), and horticulture sectors (from increased use and subsequent run off of Nitrogen, Potassium and Phosphorous fertilisers and pesticides)
- The infant formula, beverages and prepared consumer food sector could have similar implications for water quality. In this case, they will be mainly associated with waste water impacts (i.e. increased waste water treatment capacity requirements) from increased volumes of processing.

Data Limitations

Water quality is regularly monitored by the EPA. However, published information relates to the first WFD reporting period (EPA, 2010) and the status of the environment reports (EPA, 2012). The next WFD reporting period of 2015 requires a review and update of RBDMPs. A number of Integrated Water Quality Reports (e.g. EPA, 2011) provide updates on water quality data. The assessment of the Agri-Food Strategy 2025 will have to be based on existing baseline information, limiting the assessment of trends and future projections.

3.5. Soils and Geology

Bedrock geology has a major influence in landform and provides the parent material from which soils are created. The nature of the bedrock determines the nature and chemistry of the soil formed, which strongly affects the natural vegetation and the type of agriculture that it can sustain.

Although there is no specific legislation for the protection of soil resources, there is currently an EU Thematic Strategy on the protection of soil which includes a proposal for a Soil Framework Directive (CEC, 2006) which has yet to materialise. Teagasc has recently updated the soils map of Ireland (Figure 9), which has been published through a Soil Information System⁵. Soil types vary significantly throughout the country; some areas have well drained, highly fertile and highly productive soils (e.g. acid brown earths), while others are covered by blanked peats that are of little use to agriculture. Moreover, many of the peatland soils in the country are protected under the Habitats Directive.

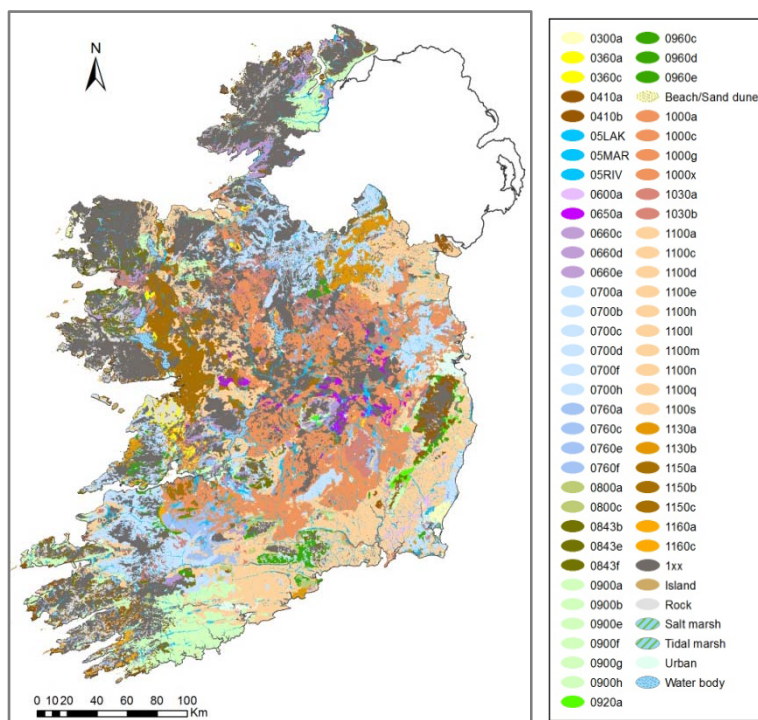


Figure 9. Soil associations. Data source: Teagasc, 2014.

⁵ <http://gis.teagasc.ie/soils/>

The drainage and fertility characteristics of soils largely determine their use and value from an agricultural perspective. For example, grey brown earths (illustrated in salmon pink in Figure 9) are well drained and have high fertility, while peats (illustrated in grey) are poorly drained and have poor fertility. Wet soil conditions have been identified as the most important factor limiting the utilisation of grazing grass on Irish farms (Creighton *et al.*, 2011). In such lands, there is likely to be an enhancement of farm drainage schemes in order to increase stock carrying capacities (DAFM, 2014b).

Intensification of cultivation and grazing is most likely to be favoured in areas with more robust (i.e. fertile and well drained) soils. However, in the absence of the expected Soils Directive, the 'carrying capacity' of such soils needs to be identified and monitored so that they can be protected from over-exploitation. Teagasc's proposed Functional Soil Management concept (Schulte *et al.*, 2014) may prove effective in this respect, but it will need to be demonstrated as being workable and enforceable, and due account taken of its geographical bias for socio-economic benefits.

The SEA will consider additional soil information available from Teagasc, as well as published national data on important geological features (i.e. sites of geological interest to be proposed as Natural Heritage Areas).

Potential Environmental Issues

- Soil erosion in winter periods can be anticipated from the cereals and horticulture sectors, when the farmland is uncultivated or fallow. This will have different magnitudes depending on soil type (e.g. sandy soils being more vulnerable to erosion). Disturbance of topsoil by tillage operations can have further implications in terms of organic matter loss through decomposition.
- Overgrazing of commonages by sheep has the potential to result not only in soil erosion but also soil compaction.
- Soil degradation (with regards to acidification, nutrient imbalance or soil biodiversity deterioration) can derive from activities from the forestry sector in particular. The dairy, meat and cereal sectors can also generate nutrient imbalances and soil contamination as a result of fertiliser application and manure spreading beyond soil assimilative capacities. Nevertheless, with proper management, recycling agricultural waste through land spreading can provide valuable nutrients to assist in crop productivity.

Data Limitations

Soil productivity and drainage maps are still to be produced, and limited information exists on soil organic matter and soil compaction. These information gaps, together with a lack of spatial detail on the implementation of the Strategy are anticipated to affect the assessment.

3.6. Landscape

There is no specific legislation for the protection of the landscape, but the Planning and Development Acts 2000-2011 have recently introduced requirements for the preservation of the character of the landscape, including statutory provision for areas of special amenity and landscape conservation areas. In addition, and following from the Draft Landscape and Landscape Assessment Guidelines (DoELG, 2000), the Department of Arts, Heritage and the Gaeltacht recently issued a National

Landscape Strategy for Ireland (DAHG, 2014). One of its main objectives is to develop a national landscape character assessment.

The Irish landscape is largely shaped by agricultural practices. It is currently dominated by pastures (approximately 68%) with small pockets of forestry covering 11% of the landmass (Figure 10). Main land-use changes in recent years include an increase in the amount of forested lands and artificial areas and a decrease in the total amount of agricultural land and peatland (EPA, 2012). Modernisation of agricultural practices have resulted in larger farms - particularly for arable production, changes in crops (reduction of hay in favour of silage) and overall intensification of agricultural production (DAFM, 2014b). These changes are most noticeable in the East and South where more favourable soil conditions have resulted in increased specialisation and corresponding landscape homogeneity.

The SEA will also take into account scenic landscapes, Special Area Amenity Orders, National Parks and protected views and prospects designated at county level.

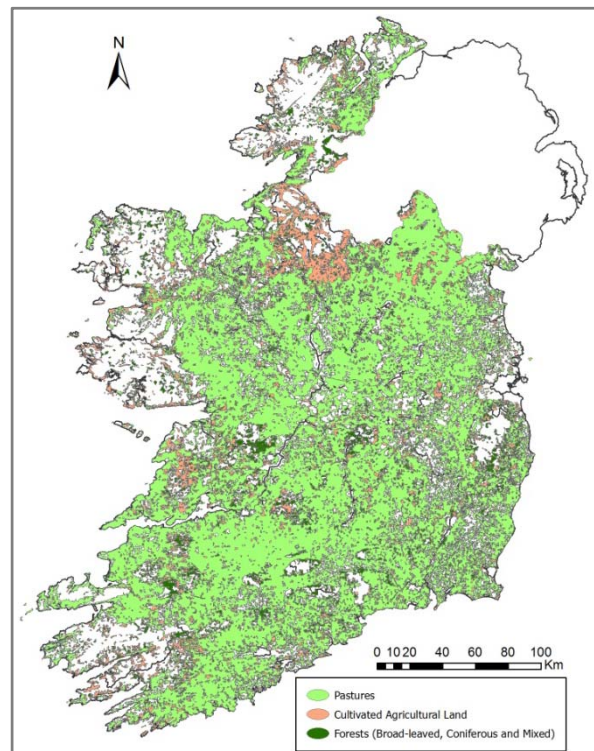


Figure 10. Agricultural land-uses. Data source: CORINE, 2012.

Potential Environmental Issues

- Land-use changes, particularly associated with the forestry and cereal sectors, have the potential to alter local landscapes. Landscape changes are likely to occur as a result of intensification on previously extensively managed farmland, intensification of harvest patterns (e.g. silage, but also barley and wheat monocultures to support the beverages sector) and, more importantly, from increased afforestation and the development of new forest roads. These activities may result in an increased homogenisation of local landscapes.
- The dairy and infant formula sectors have also the potential to result in land-use/landscape changes from intensification of grazing patterns and possible land rationalisation. This could result in enlargement of field sizes with the consequent removal of field boundaries and tree lines/hedgerows affecting the visual appearance of the local landscape.
- Conversely, landscape (as well as biodiversity) impacts may also follow on from the abandonment of traditional management practices that might be deemed uneconomic (e.g. under-grazing of commonage).

Data Limitations

No national landscape character mapping or protection policies currently exist and landscape characterisation and sensitivity mapping is inconsistent across counties, thereby limiting the extent to which landscape effects can be assessed.

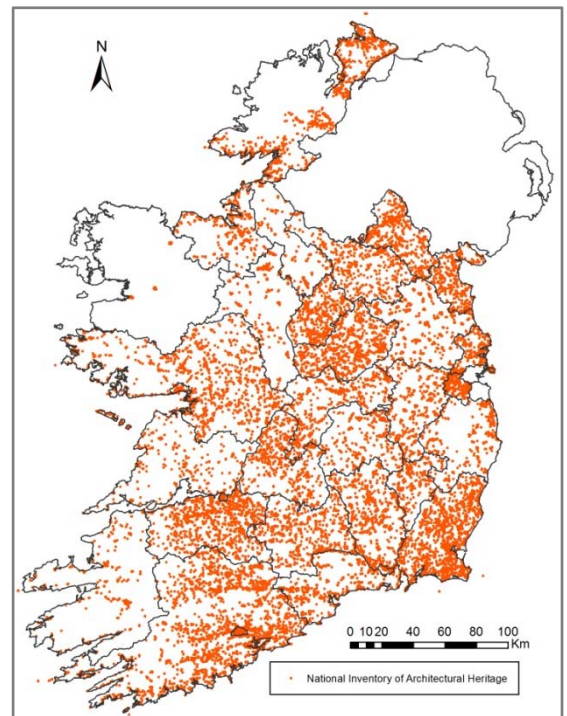
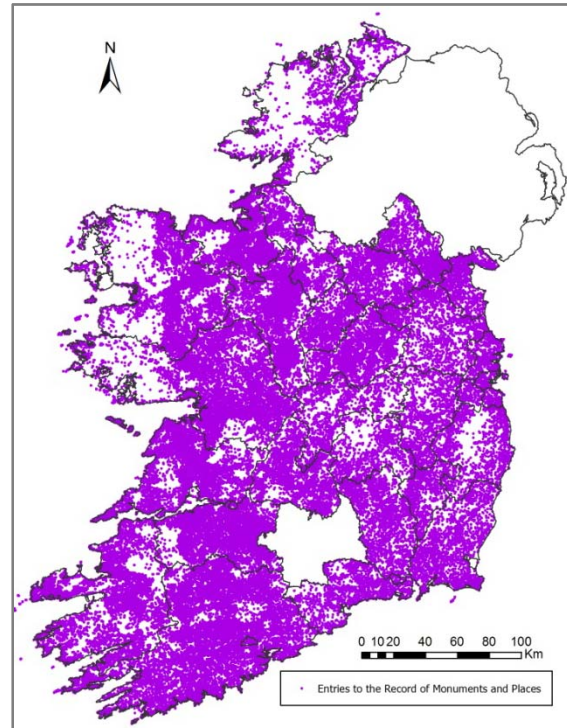
3.7. Cultural Heritage

Cultural heritage encompasses both archaeological and architectural heritage. Archaeological heritage is protected under the National Monuments Acts (1930-2004), Natural Cultural Institutions Act 1997, and the Planning and Development Acts 2000-2010. The Record of Monuments and Places - RMPs (Figure 11) is an inventory of sites and areas of archaeological significance protected under the National Monuments Acts 1930 to 2004. Although no significant conflicts are currently anticipated between the Strategy and archaeological sites and monuments, any agricultural practices (including enlargement of farm holdings and intensification) must have due regard to the protection of RMPs.

Figure 11. Record of Monuments and Places. Data source: National Monuments Service, 2014.

Architectural heritage refers to structures and buildings together with their settings and attendant grounds, fixtures and fittings; groups of structures and buildings; and sites which are of technical, historical, archaeological, artistic, cultural, scientific, social, or technical interest. They are protected under the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999. The primary source for architectural heritage is the Record of Protected Structures (RPS), collated at county level, and protected under the Planning and Development Acts 2000-2010. Inclusion in the National Inventory of Architectural Heritage (Figure 12) represents the first step towards a RPS designation. The majority of these structures and buildings are within urban settlements and, therefore, it is unlikely that there will be any significant conflict with the Strategy.

Figure 12. National Inventory of Architectural Heritage. Data source: Department of Arts, Heritage and the Gaeltacht, 2014.



3.8. Material Assets

Material assets refer to man-made infrastructure, including transport-related (e.g. roads, canals), public services (e.g. waste water treatment, water supply) and recreational facilities (e.g. picnic areas, walking routes, golf courses). Certain public services such as water and energy supply and

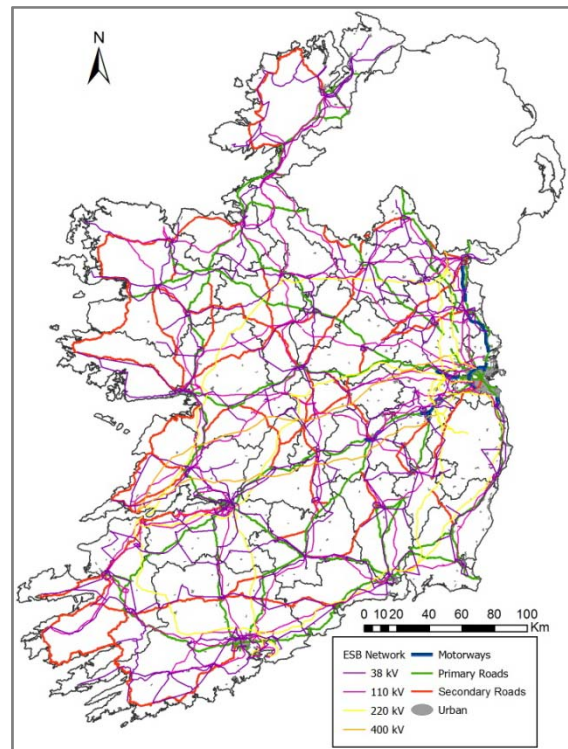
waste management infrastructure (Figures 13 and 14) are planned and permitted through specific processes that are informed by the existing and future needs identified within County Development Plans and Local Area Plans. Material assets also encompass natural assets with development potential such as aquaculture, wind energy or undeveloped lands, as well as financial attributes of current livelihoods (e.g. business or brand identify).

The SEA will take into account the overall capacity of the water supply, energy supply, solid waste and waste water services in meeting any additional significant demands imposed by the Strategy.

Potential Environmental Issues

- In the context of the Agri-Food Strategy 2025, the infant formula, beverages and prepared consumer foods sectors are most likely to increase the demand for certain services such as energy and water supply and waste water treatment capacity.
- Significant effects can also be anticipated on commonages from overgrazing associated with an intensification of the meat sector.
- Other potential effects can derive from activities that might damage the reputation of a high quality brand identity for Irish niche products.

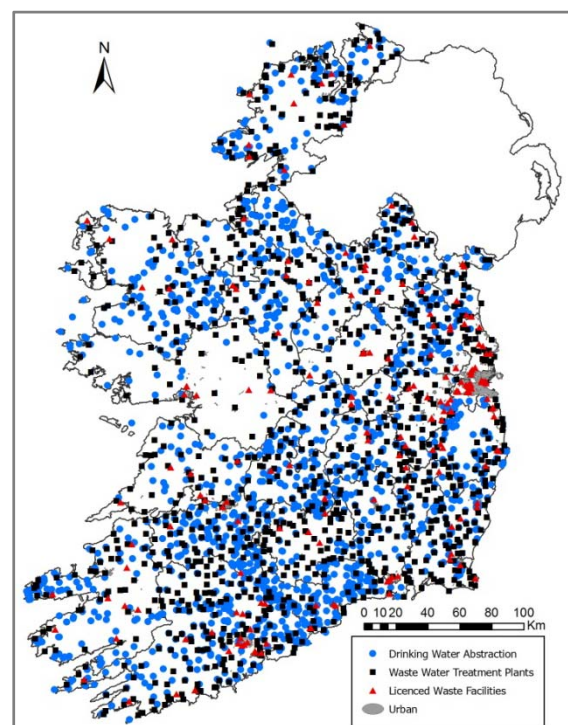
Figure 13. Road and electricity infrastructure. Data sources: ESB, 2014 and OSI, 2010.



Data Limitations

Although the capacity of public services in relation to water energy and waste management is periodically monitored, much of the data are not readily available. Moreover, the lack of spatial detail on the implementation of the Strategy will make difficult the assessment of demands and, thereby, the supply and treatment requirements in each region/area.

Figure 14. Drinking water, waste water and solid waste treatment infrastructure. Data source: EPA, 2015.



3.9. Summary of Potential for Significant Environmental Effects

The potential for significant effects identified in Sections 3.1 to 3.8 are summarised in Table 3 below. It helps illustrate the inter-relationships and interactions between the environmental factors (Section 3.10), in addition to the potential for cumulative effects across sectors (Section 3.11).

Environmental component	Sector	Potential for Significant Effect
Biodiversity, Flora and Fauna	Seafood	<ul style="list-style-type: none"> • Degradation of local habitats (e.g. alteration of nutrient balance, waste) • Effects on flora and fauna (e.g. gene pool, disease, disturbance, invasive species) • Novel impacts from harvesting, culturing, processing and marketing new species and products (e.g. boarfish/seaweeds)
	Meat and Cereals	<ul style="list-style-type: none"> • Effects on biodiversity (particularly wild birds) as a result of intensification • Biodiversity loss (monocultures and hedgerow removal)
	Forestry	<ul style="list-style-type: none"> • Effects on habitats, flora and fauna (e.g. monocultures, non-native species)
	Dairy and Infant Formula	<ul style="list-style-type: none"> • Effects on habitats, flora and fauna
	Beverages, PCF and Horticulture	<ul style="list-style-type: none"> • Effects on habitats, flora and fauna (pesticides) • Biodiversity loss (monocultures and hedgerow removal)
Population and Human Health	Dairy and Infant Formula	<ul style="list-style-type: none"> • Human health (formula production/marketing – WHO)
Water	Meat and Cereals	<ul style="list-style-type: none"> • Increased animal waste and ammonia, as well as silage effluent • Deterioration of surface water quality (N,K,P fertiliser run off, sediments)
	Forestry	<ul style="list-style-type: none"> • Deterioration of surface water quality (e.g. fertilisers – nitrates, siltation)
	Dairy and Infant Formula	<ul style="list-style-type: none"> • Deterioration of surface water quality (manures) • Wastewater impacts etc. from increased processing
	Beverages, PCF and Horticulture	<ul style="list-style-type: none"> • Deterioration of surface water quality (increase in N,K,P, fertiliser run off and pesticides)
Air Quality and Climate	Meat and Cereals	<ul style="list-style-type: none"> • Increased GHG emissions • Increased Carbon emissions (ploughing of grassland)
	Forestry	<ul style="list-style-type: none"> • Carbon sequestration
	Dairy and Infant Formula	<ul style="list-style-type: none"> • Increased Carbon emissions
	Beverages, PCF and Horticulture	<ul style="list-style-type: none"> • Increased emissions (transport) and from energy consumption (processing)

Table 3. Summary of potential significant environmental effects (cont.).

Environmental component	Sector	Potential for Significant Effect
Soils and Geology	Meat and Cereals	<ul style="list-style-type: none"> • Soil erosion in winter period • Overgrazing of commonages (sheep)
	Forestry	<ul style="list-style-type: none"> • Soil degradation (e.g. acidification, nutrient balance, biodiversity)
	Beverages, PCF and Horticulture	<ul style="list-style-type: none"> • Soil erosion in winter period
Landscape	Forestry	<ul style="list-style-type: none"> • Landscape (e.g. land use change) • Development of forest roads
	Dairy and Infant Formula	<ul style="list-style-type: none"> • Landscape/landuse change from grazing patterns and possible land rationalisation
	Beverages, PCF and Horticulture	<ul style="list-style-type: none"> • Landscape/landuse change from harvest (barley, wheat monocultures) patterns
Material Assets	Seafood	<ul style="list-style-type: none"> • Effects on material assets (e.g. recreational industries)
	Meat and Cereals	<ul style="list-style-type: none"> • Impacts on commonages(undergrazing/over-grazing/reorganisation)
	Beverages, PCF and Horticulture	<ul style="list-style-type: none"> • Maintaining high quality marketing brand identities • Cross-sectoral conflict between increasingly large food production firms and niche-market SMEs with 'green' trading advantages

Table 3. Summary of potential significant environmental effects (cont.).

3.10. Inter-relationships

The SEA Directive requires that any inter-relationships between environmental factors are identified for their combined assessment (Table 4). The inter-relationships identified in Sections 3.1 to 3.8 above can be summarised as follows:

- Effects on human health and well-being can derive from Interactions with environmental factors such as water, soil or air through which contaminants or pollutants can come in contact with human beings.
- Water-dependant habitats and species (freshwater pearl mussel, shellfish waters and nutrient sensitive habitats in particular - Figure 15), can be affected by changes in water quality (e.g. contamination or eutrophication).

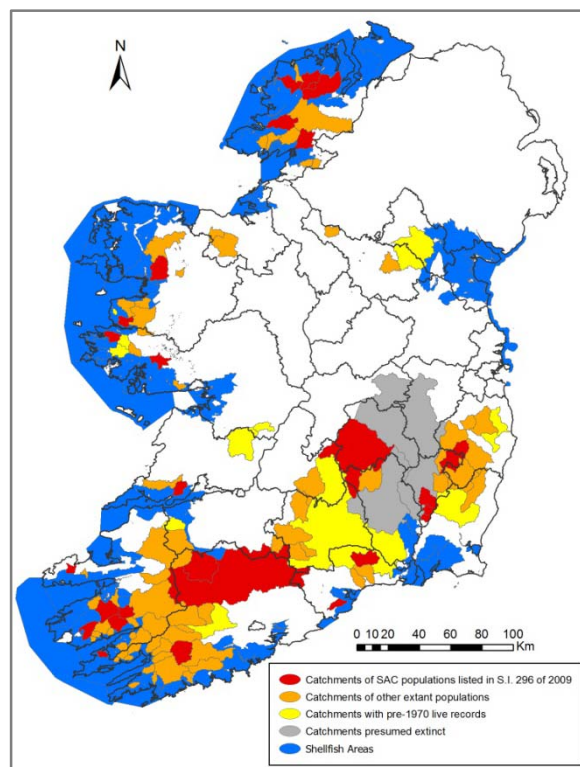


Figure 15. Freshwater pearl mussel and shellfish areas. Data source: EPA, 2015.

- Air pollutants such as NO_x contribute to acidification of soils and surface waters, which in turn can have effects on biodiversity, flora, fauna and human health.
- Agricultural landscapes are shaped by and, therefore, inter-relate with soil, water, climate and biodiversity, in addition to population and socio-economic factors (e.g. investment, market demand, etc.). The opposite is also true, whereby landscape attributes (e.g. topography, slope) shape agricultural practices.
- Soils play a key role in drainage, filtration and flood protection and, as such, can contain the spread and buffer the effect of contaminants in surface and groundwaters.
- Changes in climate could result in a variation in rainfall which would have an effect on other environmental aspects such as biodiversity and water flows. In the context of the agricultural sector, climate change predictions must be given due consideration when managing the lands (e.g. as wetter summers may lead to greater pesticide use). Moreover, climate change may have significant effects on the seafood sector (aquaculture) as a result of increases in water temperature, and deterioration in the operational window for fishing.

	Population and Human Health	Biodiversity, Flora and Fauna	Air Quality and Climate Change	Water	Soils and Geology	Landscape	Cultural Heritage	Material Assets
Population and Human Health		✓	✓	✓	✓	✓	✓	✓
Biodiversity, Flora and Fauna	✓		✓	✓	✓	✓		✓
Air Quality and Climate Change	✓	✓		✓	✓	✓		✓
Water	✓	✓			✓	✓		✓
Soils and Geology	✓	✓		✓		✓		
Landscape	✓	✓		✓	✓		✓	
Cultural Heritage	✓					✓		
Material Assets	✓	✓	✓	✓				

Table 4. Matrix of main potential inter-relationships.

The Environmental Liability Directive (EC, 2004) plays a significant role in dealing with any direct or indirect damage to the aquatic environment, Natura 2000 sites and land contamination thereby addressing the inter-relationships between a number of environmental factors. The polluter pays principle applies in all relevant cases with objective of reverting any environmental effects on water, soil and/or biodiversity.

In addition to the inter-relationship between environmental factors summarised above, the following possible sectoral conflicts within the Strategy are also identified.

- Potential conflicts between sectoral targets and the carrying capacity of the land.

- Potential conflict of opinion between sub-sectors over the use of Genetically Modified Organisms (GMOs) and grass reseeding intervals.
- Diversity of opinion on the role and necessity for high market value organic produce, and its association with health and environmental factors.

3.11. Cumulative Effects

Cumulative effects are changes to the environment that are caused by an action in combination with other past, present, and future actions. This will include the collective effects of the various sectoral activities contemplated in the Strategy. Cumulative effects can also be examined in the context of the overall environmental sensitivity of the receiving environment - where the higher the number of vulnerable aspects occurring in one area (e.g. high water quality, designated ecological sites and protected landscapes), the higher the sensitivity of that area to change.

The SEA will take account of both approaches as far as possible. It will examine the overall sensitivity of the receiving environment but will mainly focus on the aggregated sectoral effects. The potential for cumulative effects is likely to be associated with the combined intensification and expansion of the various sectors in terms of the carrying capacity of the environment, with particular focus on water quality, biodiversity protection, soil productivity, landscape amenity and public services (i.e. water and energy supply and waste management).

4. Assessment Detail

Although it is anticipated that sectoral targets will be specific and quantitative, their regional and/or local implementation is currently unknown. Therefore, given the timeframe, only the generic implications of the proposed actions will be assessed in both the SEA and AA. Due to the strategic nature of these actions, site-specific impacts and scientific predictions/modelling of impacts will not be possible. The assessments will be rather broad-brush and qualitative. Such an approach, whereby impacts are examined at national level, is likely to mask the effects of individual actions at local level. As a result, in many cases, recommendations will be made for more detailed assessments in the context of subsequent regional implementation plans or Strategy milestones. In such cases, it may be argued that local impacts are to be avoided through strict adherence to legislation, through more detailed mitigation measures deriving from the SEA of regional implementation plans or Environmental Impact Assessment (EIA), or the adoption/adherence to validated codes of practice.

5. Mitigation Approaches

SEA requires devising mitigation measures to avoid, reduce, remedy or offset the potential for significant adverse effects as identified in Section 3. Mitigation measures are commonly directly linked to potential impacts. They entail amending those draft objectives and targets that may result in significant adverse effects on the environment, or incorporating new objectives and targets to ensure such effects are addressed and mitigated. Mitigation measures will be discussed with the Strategy Team once objectives have been finalised and draft targets have been provided and assessed.

It is anticipated that, given the assessment detail limitations outlined in Section 6, one of the principal mitigation measures to be implemented is the requirement for the **preparation of the Strategy's regional implementation plans or milestones**. These should provide more detailed regional targets with, wherever possible, spatially-specific actions and measures. The assessment of these regional plans/milestones will therefore enable a more accurate and robust prediction and assessment of potential significant effects on the environment.

Additional measures can also be incorporated to achieve at least partial mitigation by indirect means. These include:

Mitigation through financial oversight: As recently evidenced from 'ghost' housing estates, significant environmental damage can occur from incomplete or stalled projects (as hinted at in the Agri-Food Strategy Group submission); ill-informed, inadequate or ill-thought-out lending structures or over-ambitious borrowing could contribute to environmental damage if schemes dependent upon follow-through mitigation fail. Greater agricultural awareness within financial institutions and the production of better business plans and financial projections by borrowers could help mitigate this.

Research as mitigation: The Strategy advocates and is to a large extent reliant on new 'smart' solutions; the challenge is to provide a sufficient support structure that can transform research findings into on-the-ground practice (Agri-Food Strategy Group submission).

Certification as mitigation: Certain labels might themselves become valid as mitigation approaches. The Strategy advocates a 'Brand Name Ireland' based on Smart Green Growth. Once the sustainability criteria underpinning this identity have been identified and agreed as being validatable,

'Origin Green', 'Green Ireland' or 'Food Made in Ireland' could be underpinned with compulsory highest standard certification schemes linked to environmental criteria - with penalties for misuse and possibly, as An Tasice suggests, a levy for using the product-enhancing terminology.

Organisational mitigation: A number of submissions make practical suggestions for enhancing overall efficiency and helping ensure conformity with sustainability standards. Near-universal uptake of measures such as record keeping for all dairy cows; annual profit monitors and cash-flow budgets; membership of discussion groups; balancing the producer-processor beef market, etc. might all contribute to mitigation (Agri-Food Strategy Group submission).

References

- CEC (1992). Directive 92/43/EEC, of 21st May, on the Conservation of Natural Habitats and of Wild Fauna and Flora. Commission of the European Communities. *Official Journal of the European Union*, L206, 22.7.1992.
- CEC (2001). Directive 2001/42/EC, of 27th June, on the Assessment of the Effects of Certain Plans and Programmes on the Environment. Commission of the European Communities. *Official Journal of the European Union*, L 197/30, 21.7.2001.
- CEC (2006). Proposal for a Directive of the European Parliament and of the Council establishing a Framework for the Protection of Soil and amending Directive 2004/35/EC. Commission of the European Communities. Brussels, 22.9.2006, COM(2006) 232 final 2006/0086 (COD).
- CEC (2009). Council Directive 2009/147/EC, of 30th November, on the Conservation of Wild Birds (codified version). Commission of the European Communities. *Official Journal of the European Union*, L20/7, 26.1.2010.
- Creighton, P, O'Donovan, M and Shalloo, L (2011). The Benefits of Sward Renewal. URL: <http://www.agresearch.teagasc.ie/moorepark/Articles/Positive%20farmer%20Conference%20Philip%20Creighton%202012%20final.pdf>
- DAFM (2010) Food Harvest 2020, A Vision for Irish Agri-food and Fisheries. Department of Agriculture, Food and the Marine: Ireland. URL: <http://www.agriculture.gov.ie/media/migration/agri-foodindustry/foodharvest2020/2020FoodHarvestEng240810.pdf>
- DAFM (2014a). Draft Forestry Programme 2014 – 2020. Department of Agriculture, Food and the Marine: Ireland. URL: <http://www.agriculture.gov.ie/media/migration/forestry/publicconsultation/newforestryprogramme2014-2020/forestryprogramme2014-2020/DraftForestryProgramme20142020PubCon.pdf>
- DAFM (2014b). Environmental Analysis of Food Harvest 2020. Prepared by Philip Farrelly and Co. for DAFM. URL: <http://www.agriculture.gov.ie/media/migration/ruralenvironment/climatechange/FoodHarvest2020EnvironmentalAnalysisFINAL050214.pdf>
- DAFM (2015). Draft Seafood Programme 2020. Department of Agriculture, Food and the Marine: Ireland. URL: <http://www.agriculture.gov.ie/fisheries/marineagenciesprogrammesdivision/futureseafooddevelopmentinireland2014-2020/>
- DAHG (2011). Actions for Biodiversity 2011-2016; Ireland's National Biodiversity Plan. Department of Arts, Heritage and the Gaeltacht: Ireland. URL: <http://www.ahg.gov.ie/en/Publications/HeritagePublications/NatureConservationPublications/Actions%20for%20Biodiversity%202011%20-%202016.pdf>
- DAHG (2011). European Communities (Birds and Natural Habitats) Regulations, Statutory Instrument No. 477/2011. Department of Arts, Heritage and the Gaeltacht, Government of Ireland. URL: <http://www.irishstatutebook.ie/2011/en/si/0477.html>
- DAHG (2014). A Draft National Landscape Strategy for Ireland 2014-2024. Department of Arts, Heritage and the Gaeltacht: Ireland. URL: <http://www.ahg.gov.ie/en/Publications/HeritagePublications/ArchitecturalPolicyPublications/NLSJuly2014v2.pdf>
- DEHLG (2004). Implementation of SEA Directive (2001/42/EC): Assessment of the Effects of Certain Plans and Programmes on the Environment Guidelines for Regional Authorities and Planning

- Authorities. Ireland: Department of Environment, Heritage and Local Government, Government of Ireland. URL: <http://www.environ.ie/en/Publications/DevelopmentandHousing/Planning/FileDownload,1616,en.pdf>
- DEHLG (2009a). Appropriate Assessment of Plans and Projects in Ireland Guidance for Planning Authorities. Ireland: Department of Environment, Heritage and Local Government, Government of Ireland. URL: <http://www.birdwatchireland.ie/LinkClick.aspx?fileticket=aeLSNXL11hU=&tabid=250consultation/name,25835,en.html>
- DoELG (2000). Draft Landscape and Landscape Assessment Guidelines. Department of the Environment and Local Government: Ireland. URL: <http://www.google.ie/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0CCAQFjAA&url=http%3A%2F%2Fwww.environ.ie%2Fen%2FPublications%2FDevelopmentandHousing%2FPlanning%2FFileDownload%2C1608%2Cen.doc&ei=EOsbVdWjAYae7gbnhYAw&usg=AFQjCNG-Nh1eJim8ldyWs6bvAzT4col4Sg>
- EC (2000). Directive 2000/60/EC, of 23rd October, Establishing a Framework for Community Action in the Field of Water Policy. European Commission. *Official Journal of the European Union*, L327, 22.12.2000.
- EC (2000). Managing Natura 2000 Sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/CEE. Office for Official Publications of the European Communities: Luxemburg. URL: http://ec.europa.eu/environment/nature/natura2000/management/docs/art6/provision_of_art6_en.pdf
- EC (2001). Directive 2001/81/EC of the European Parliament and of the Council, of 23 October 2001, on National Emission Ceilings for Certain Atmospheric Pollutants. European Commission. *Official Journal of the European Union*, L309, 27.11.2001.
- EC (2002). 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. Office for Official Publications of the European Communities. European Commission, DG Environment. URL: http://ec.europa.eu/environment/nature/natura2000/management/docs/art6/natura_2000_assess_en.pdf
- EC (2004). Directive 2004/35/EC of the European Parliament and of the Council, of 21 April 2004, on Environmental Liability with regard to the Prevention and Remedying of Environmental Damage. European Commission. *Official Journal of the European Union*, L143/56, 30.04.2004.
- EC (2011). Communication from the Commission to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions. Our Life Insurance, Our Natural Capital: An EU Biodiversity Strategy to 2020. Brussels, 3.5.2011 COM(2011) 244 final. European Commission. URL: <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52011DC0244&from=EN>
- EC (2012). Guidance on Integrating Climate Change and Biodiversity into Strategic Environmental Assessment. European Commission. URL: <http://ec.europa.eu/environment/eia/pdf/SEA%20Guidance.pdf>
- EEC (1991). Council Directive 91/676/EEC of 12 December 1991, concerning the Protection of Waters against Pollution Caused by Nitrates from Agricultural Sources. European Economic Community. *Official Journal of the European Union*, L375, 31.12.1991.
- EP & CEU (2008), 2008. Directive 2008/50/EC of the European Parliament and of the Council, of 21 May 2008, on Ambient Air Quality and Cleaner Air for Europe. *Official Journal of the European*

- Union*, L152, 11.06.2008. URL: <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32008L0050&from=EN>
- EPA (2009). GISEA Manual: Current Practice and Potential on the Application of Geographic Information Systems as a Support Tool in Strategic Environmental Assessment of Irish Land Use Plans. Prepared by González, A. for the Environmental Protection Agency: Ireland. URL: <http://www.epa.ie/downloads/>
- EPA (2010). Water Quality in Ireland 2007-2009. Environmental Protection Agency: Ireland. URL: <http://www.epa.ie/pubs/reports/water/waterqua/WaterQuality0709.pdf>
- EPA (2011). Integrated Water Quality Report - South East Ireland. Environmental Protection Agency: Ireland. URL: http://www.epa.ie/pubs/reports/water/waterqua/integwaterqual/EPA_IWQR_SE2011_AnnualReport.pdf
- EPA (2012). Integrated Water Quality Report - Galway and Mayo. Environmental Protection Agency: Ireland. URL: http://www.epa.ie/pubs/reports/water/waterqua/IQWR_GalwayMayo2012.pdf
- EPA (2012). Ireland's Environment - As Assessment. Environmental Protection Agency: Ireland. URL: http://www.epa.ie/pubs/reports/indicators/00061_EPA_SoE_2012.pdf
- EPA (2013). Drinking Water Report 2013. Environmental Protection Agency: Ireland. URL: <http://www.epa.ie/pubs/reports/water/drinking/Drinking%20Water%20Report%20Web.pdf>
- EPA (2013a). Integrated Biodiversity Impact Assessment – Streamlining AA, SEA and EIA Processes: Practitioner's Manual. Prepared by González, A. for the Environmental Protection Agency: Ireland. URL: <https://www.epa.ie/pubs/reports/research/biodiversity/Integrated%20Biodiversity%20Impact%20Assessment%20-%20Streamlining%20AA,%20SEA%20and%20EIA%20Processes%20-%20Practitioner's%20Manual.pdf>
- EPA (2013b). Air Quality in Ireland - Key Indicators of Ambient Air Quality. Environmental Protection Agency: Ireland. URL: http://www.epa.ie/pubs/reports/air/quality/Air_quality%20Report%202013.pdf
- EPA (2013c). Ireland's Provisional Greenhouse Gas Emissions in 2013. Environmental Protection Agency: Ireland. URL: <http://www.epa.ie/pubs/reports/air/airemissions/GHGprov.pdf>
- EPA (in press). Developing and Assessing Alternatives in Strategic Environmental Assessment - Good Practice Guidance. Prepared by González, A., Thérivel, R., Fry, J., and Foley, W. for the Environmental Protection Agency: Ireland.
- Fellmann, T (ed.) Van Doorslaer, V, Witzke, P, Huck, I, Weiss, F, Fellmann, T, Salputra, G, Jansson, A, Drabik, D, Leip, A (2015). An economic Assessment of GHG Mitigation Policy Options for EU Agriculture. JRC Report EUR 27097 EN Institute for Prospective Technological Studies. Luxembourg: Publications Office of the European Union. URL: <https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/economic-assessment-ghg-mitigation-policy-options-eu-agriculture>
- Gol (2012). Wildlife Amendment Act 2012. Government of Ireland: Ireland. URL: <http://www.irishstatutebook.ie/2012/en/act/pub/0029/print.html>
- JCAFM (2014). Report on Land Use: Maximising its Potential. Joint Committee on Agriculture, Food and the Marine, Houses of the Oireachtas: Dublin (Report AFM 003). URL: <http://www.oireachtas.ie/parliament/oireachtasbusiness/www.oireachtas/committees/committee-reports/>

NBDC (2010). Ireland's Biodiversity in 2010: Knowledge Gaps. National Biodiversity Data Centre, Waterford: Ireland. URL: <http://biodiversity.biodiversityireland.ie/wordpress/wp-content/uploads/Knowledge-Gaps-20101.pdf>

Schulte, RPO, Creamer, RC, Donnellan, T, Farrelly, N, Fealy, R, O'Donoghue, C and O'hUallachain, D (2014). Functional Land Management: A Framework for Managing Soil-based Ecosystem Services for the Sustainable Intensification of Agriculture. *Environmental Science and Policy*, 38: 45-58.

Teagasc (2013). Greenhouse Gas Emissions by Irish Agriculture: Consequences arising from the Food Harvest Targets. Prepared by T. Donnellan and K. Hanrahan. Teagasc: Ireland. URL: <http://www.tnet.teagasc.ie/fapri/downloads/pubs2013/ghgprojections2012.pdf>

NB: other undated textual citations relate to submissions made to DAFM in response to the questionnaire on FoodHarvest 2020 in anticipation of the development of Agri-Food Strategy 2025. URL: <http://www.agriculture.gov.ie/2025strategy/>