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Methodology:

Compilation of Ecosystem Extent Maps

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1 Overview

1.1 What are Ecosystem Accounts?

The [System of Environmental Economic Accounting - Ecosystem Accounting](#) (SEEA-EA) is a spatially-based, integrated statistical framework for organising biophysical information about ecosystems, measuring ecosystem services, tracking changes in ecosystem extent and condition, valuing ecosystem services and assets and linking this information to measures of economic and human activity. It is an integrated statistical framework adopted by the United Nations Statistical Commission.

The SEEA-EA outlines five sets of ecosystem accounts:

1. Ecosystem extent accounts
2. Ecosystem condition accounts
3. Ecosystem services (physical flow)
4. Ecosystem services (monetary flow)
5. Monetary ecosystem asset accounts

As part of a recent amendment to [Regulation \(EU\) No 691/2011](#) on environmental economic accounts, it will be mandatory to report ecosystem extent, condition and services (physical flow) accounts in line with SEEA-EA. The monetary flow of ecosystem services and the monetary value of ecosystem assets will not need to be accounted for under the new regulation. Mandatory reporting by member states will commence in 2026.

To produce ecosystem extent, condition and service accounts it is essential to map the total extent of all ecosystems within an ecosystem accounting area (EAA). For national level accounting, the EAA is the total extent of the territory of Ireland. For these accounts, it is the total area of Ireland in which terrestrial and transitional ecosystems occur.

1.2 Which ecosystems were mapped?

The ecosystems mapped as part of this release are given in Table 1. These are the terrestrial and transitional ecosystem types at levels one and two of the new EU ecosystem [typology](#) (Table 1). These were mapped using a minimum mapping unit (MMU) of 1 hectare, meaning that ecosystems occurring at a smaller spatial scale were generally not mapped. There were two exceptions to this:

- 1) The level two ecosystem type ‘Natural & Semi-Natural Grassland’ was mapped at an MMU of 25 hectares.
- 2) Areas where one or more ecosystem type occurred within a 1-hectare area. This typically occurs at the boundary of two ecosystems (e.g. Grassland and Woodland). When this happens, the mapped ecosystem is that which has the bigger area within the 1-hectare area. Therefore, the smallest possible mapped area is 0.033 hectares (i.e. where source data suggests the occurrences of all 30 ecosystem types within the same 1-hectare areas). However, such occurrences are exceedingly rare (see below section ‘Accuracy of classified ecosystem extent map’).

Table 1. Description of level two of EU ecosystem typology (excluding Marine ecosystems).

Ecosystem type (Level 1)	Ecosystem type (Level 2)	Description
1. Settlements & Other Artificial Areas	1.1 Continuous Settlement Area	Also designated as continuous urban area or fabric. The Continuous Settlement Area type is assigned when settlement structures and transport networks are dominating the surface area. At least 80% of the land surface in the ecosystem asset is covered by impermeable features such as buildings, roads and artificially surfaced areas.
	1.2 Discontinuous Settlement Area	Also designated as discontinuous urban area or fabric. The Discontinuous Settlement Area type is assigned when settlement structures and transport networks associated with vegetated areas and bare surfaces are present and occupy significant surfaces in a discontinuous spatial pattern. The impermeable features such as buildings, roads and artificially surfaced areas range from 30 to 80 % land coverage in the ecosystem asset.
	1.3 Infrastructure & Industrial Areas	This includes land used for transport infrastructure such as roads, airports and ports, including associated areas (e.g. planted trees and bushes lines or spontaneous vegetation, such as grass verges), and artificial areas other than buildings that are used for commercial and industrial purposes including extraction sites, dump areas, and construction sites.
	1.4 Urban Greenspace	Areas with vegetation within or partly embraced by urban fabric. This class is assigned for urban greenery, which usually has recreational or ornamental character and is usually accessible for the public. Includes small urban water bodies. Areas with soil sealing above 30% should be moved to class 1.1 or 1.2.
	1.5 Other Artificial Areas	Areas that are artificial but do not fall under the other level 2 categories of settlements and artificial areas. This includes e.g. permanent green houses, cemeteries even if predominantly green. Countries should also record here types of artificial land of specific national importance, such as archaeological sites or others, if they do not belong to any of the level 2 categories 1.1 -1.4. Countries should inform what they cover in this category in a footnote in the questionnaire.
2. Cropland	2.1 Annual Cropland	Cropland planted for annually or regularly harvested crops other than those that carry trees or shrubs. They include fields of cereals, of sunflowers and other oil seed plants, of beets, legumes, fodder, potatoes, and other forbs. Croplands comprise intensively cultivated fields, fallow land, temporary grass for silage and grazing as well as traditionally and extensively cultivated crops with little or no chemical fertilisation or pesticide application. Faunal and floral quality and diversity depend on the intensity of agricultural use and on the presence of borders of (semi-)natural vegetation and woody structures between fields. Includes non-permanent greenhouse installations such as film tunnels. Small semi-natural elements which are associated with agricultural land use, such as hedges, ponds, grassy margins etc., are considered part of this ecosystem type.
	2.2 Rice Fields	Inundated or inundatable fields used for the cultivation of rice (<i>Oryza sativa</i>). When not too heavily treated, they may provide substitution habitats for some wetland species, for example resident birds (e.g. ducks, rails and herons) and as feeding grounds for migratory birds.

	2.3 Permanent Crops	Crops not under a rotation system which provide repeated harvests and occupy the land for a long period before they are renewed. Mainly plantations of woody crops, e.g. vineyards, fruit and berry plantations, olive groves. Excludes pastures, grazing lands and forests. Small semi-natural elements which are associated with agricultural land use, such as hedges, ponds, grassy margins etc., are considered part of this ecosystem type. Includes burnt areas of this type.
	2.4 Agro-Forestry Areas	Crops combined with scattered tree stands, with a canopy cover, in general, between 10% and 30%. A typical expression are the Iberian dehesas and montados. Includes burnt areas of this type.
	2.5 Mixed Farmland	Also designated as heterogeneous agricultural areas. Includes: Non-permanent crops (arable lands) associated with permanent crops on the same plot of farmland; juxtaposition or mosaics of small parcels of diverse annual crops, pasture/grassland and/or permanent crops; areas principally occupied by agriculture, interspersed with significant natural areas; and annual crops or grazing land under the wooded cover of forestry species (i.e., agroforestry). Characteristic is that none of these land cover types is dominant in the given unit. Small semi-natural elements which are associated with agricultural land use, such as hedges, ponds, grassy margins etc., are considered part of this ecosystem type. Includes burnt areas of this type.
	2.6 Other Farmland	Other types of farmland not included in the other categories of cropland such as nurseries, Christmas tree plantations and bioenergy grasses and short rotation coppice. Small semi-natural elements which are associated with agricultural land use, such as hedges, ponds, grassy margins etc., are considered part of this ecosystem type.
3. Grassland	3.1 Sown Pastures & Other Grass (Modified Grasslands)	Stable grassland characterised by agricultural use or strong human disturbance. Floral composition dominated by Gramineae and shaped by human activity. Regularly re-sown and fertilised and used for grazing or mechanical harvesting of grass. Small semi-natural elements which are associated with agricultural land use, such as hedges, ponds, grassy margins etc., are considered part of this ecosystem type.
	3.2 Natural and Semi-Natural Grasslands	Grasslands under no or moderate human influence. Mostly low productivity grasslands composed of native species adapted to the local environment. Can be under agro-forestry use. Often situated in areas of rough, uneven ground, steep slopes or wetter areas; frequently including rocky areas or patches of other (semi-)natural vegetation. Small semi-natural elements which are associated with agricultural land use, such as hedges, ponds, grassy margins etc., are considered part of this ecosystem type. Includes burnt areas of this type.
4. Forest & Woodland	4.1 Broadleaved Deciduous Forest	Woodlands and forests dominated by summer-green non-coniferous trees that lose their leaves in winter. Includes woodland with mixed evergreen and deciduous broadleaved trees, provided that the deciduous cover exceeds that of evergreens. The proportion of conifers should not exceed 25%. Includes burnt areas of this type.
	4.2 Coniferous Forests	Vegetation formation composed principally of trees, including shrub and bush understory, where coniferous species predominate. The proportion of deciduous trees should not exceed 25%. Includes burnt areas of this type.
	4.3 Broadleaved Evergreen Forest	Forests dominated by broadleaved sclerophyllous or lauriphyllous evergreen trees, or by palms. They are characteristic of the Mediterranean and

		warm-temperate humid zones. Sporadic grazing use may occur. Includes burnt areas of this type.
	4.4 Mixed Forests	Vegetation formation composed principally of trees, including shrub and bush understorey, where neither broadleaved nor coniferous species strongly predominate (i.e. <75% deciduous and <75% coniferous trees). Includes burnt areas of this type.
	4.5 Transitional Forest & Woodland Shrub	Transitional forests and woodland shrub. Includes vegetation that is always shrubland and areas of temporarily cleared forest (as part of forest management). Sporadic grazing use may occur. Includes burnt areas of this type.
	4.6 Plantations	Monoculture plantations or plantations strongly dominated by one or few species of non-European coniferous and broadleaved trees with very sparse or lacking undergrowth, e.g. eucalyptus plantations. Forest stands of single or mixed species consisting of native and/or non-native trees species that have long been established in European ecosystems and have diverse undergrowth typical for forest ecosystems should be classified as part of types 4.1 to 4.4. If not possible to distinguish plantations, these areas should be attributed to the classes 4.1 – 4.4. Includes burnt areas of this type
5. Heathland & Shrub	5.1 Tundra	Vegetated land with graminoids, shrubs, mosses or macro lichens overlying permafrost. European tundras are limited to Spitzbergen and northern Russia. Vegetation with the same species also occurs on boreal mountains and in the low arctic remote from the main permafrost region, notably in Fennoscandia and Iceland; these oroboreal and low arctic habitats are listed under alpine and subalpine grassland or arctic, alpine and subalpine shrub.
	5.2 Scrub & Heathland	Vegetation with low and closed cover, dominated by bushes, shrubs, dwarf shrubs (heather, briars, broom, gorse, laburnum etc.) and herbaceous plants, including semi-natural/successional stages and mature stages of development. Includes burnt areas of this type.
	5.3 Sclerophyllous Vegetation	Bushy sclerophyllous vegetation including semi-natural/successional stages and mature stages of development; including maquis, matorral and garrigue. Includes burnt areas of this type.
6. Sparsely Vegetated Ecosystems	6.1 Bare Rocks	Scree, cliffs, rock outcrops, including areas of active erosion, rocks and reef flats outside marine influence, inland salt planes. At least 90% of area of the ecosystem asset is covered by rocks. Rocks within a zone up to 100m from the high-water mark can be classified as coastal ecosystems.
	6.2 Semi-Desert, Desert & Other Sparsely Vegetated Areas	Non-coastal habitats with less than 30% vegetation cover (other than in crevices of rocks, scree or cliffs) which are characterised by very low water availability. They include areas which are sparsely vegetated due to land degradation.
	6.3 Ice Sheets, Glaciers & Perennial Snowfields	High mountain zones and high latitude land masses occupied by glaciers or by perennial snow. They may be inhabited by algae and invertebrates.
7. Inland Wetlands	7.1 Inland Marshes & Other Wetlands On Mineral Soil	Low-lying land usually flooded in winter, and more or less saturated by water all year round. Vegetation is composed mainly of rushes, sedges, and some reed and shrub. Other types of this class include reedbeds and springs.
	7.2 Mires, Bogs & Fens	Wetlands, with the water table at or above ground level for at least half of the year, dominated by mosses, herbaceous or ericoid vegetation. Includes inland saltmarshes and water logged habitats where the groundwater is frozen. Excludes the water body and rock structure of

		springs and waterlogged habitats dominated by trees or large shrubs. Includes bog degradation stages dominated by heathland but excludes wet heathlands on mineral soils which support limited peat formation. Includes peat extraction sites. Includes burnt areas of this type.
8. Rivers & Canals	8.1 Rivers & Streams	Natural watercourses, such as rivers, streams etc. (even though often modified by man) serving as water drainage channels.
	8.2 Canals, Ditches & Drains	Artificial watercourses serving as water drainage or transport channels.
9. Lakes & Reservoirs	9.1 Lakes & Ponds	Natural (but sometimes modified) water bodies with presence of standing water surface during the entire year (except in very dry years for some types).
	9.2 Artificial Reservoirs	Artificial water bodies with presence of standing water surface during most of the year. Developed mainly for water supply or energy generation purposes.
	9.3 Geothermal Pools & Wetlands (Iceland)	Hot springs, geysers, mud pots and associated wetlands resulting from interactions of deeply circulating groundwater with magma and hot rocks that produce chemically precipitated substrates. They support a specialised but low diversity biota structured by extreme thermal and geochemical gradients.
10. Marine Inlets & Transitional Waters	10.1 Coastal Lagoons	Stretches of salt or brackish water in coastal areas which are separated from the sea by a tongue of land or other similar topography. These water bodies can be connected to the sea at limited points, either permanently or for parts of the year.
	10.2 Estuaries & Bays	This class includes two main types: a) estuaries, i.e., the mouth of a river under tidal influence within which the tide ebbs and flows. b) bays, i.e., a coastal body of water partly enclosed by land and that directly connects to a larger main body of water, in particular a sea or ocean. Vegetation, and fauna is adapted to saline and/or brackish conditions. It is recommended to align the border between marine waters, estuaries and river mouths in agreement with Marine Strategy Framework Directive reporting.
	10.3 Intertidal Flats	Coastal zone under tidal influence between open sea and land, which is flooded by sea water regularly twice a day in a ca. 12 hours cycle. Defined by the area between the average lowest and highest sea water level at low tide and high tide. Generally non-vegetated expanses of mud, sand or rock lying between high and low water marks.
11. Coastal Beaches, Dunes & Wetlands	11.1 Artificial Shorelines	Man-made dykes and dams, including wave breakers extending into the sea, constructed primarily to protect land from seawater, but sometimes also used for roads. Deposited or dumped artificial structures in the coast may attract marine biota that would not otherwise occupy such locations. Excludes transport infrastructure on the shore such as ports and seaside promenades that should be recorded in Settlements & Other Artificial Areas.
	11.2 Coastal Dunes, Beaches & Sandy & Muddy Shores	Natural non-vegetated expanses of sand or pebble/gravel, in coastal locations, like beaches, dunes, gravel pads, muddy shores. Including salt-influenced wetlands between rows of dunes.
	11.3 Rocky Shores	Scree, cliffs, rock outcrops, including areas of active erosion, rocks and reef flats situated above the high-water mark up to a distance of 100 m away from the high water mark.

11.4 Coastal Saltmarshes & Salines	This class includes two main types: a) Coastal saltmarshes, which are vegetated low-lying areas in the coastal zone, mostly above the high-tide line, but always susceptible to flooding by seawater. Often in the process of being filled in by coastal mud and sand sediments, gradually being colonized by halophilic plants. b) Salt-pans for extraction of salt from salt water by evaporation, under active use or in process of abandonment. Actively exploited salines can have a rather artificial character whereas those no longer in use often have developed substantial ecological value.
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2 Data

To produce the ecosystem extent accounts, it was necessary to first map each ecosystem as part of an ecosystem extent map. The different source data used to produce extent maps for 2018 and 2021 can be found in Table 2. The data (summarised below) is a mix of EU-wide and national land cover maps, national administrative data and survey data.

2.1 CLCplus Backbone

The base landcover map used for these accounts was [CLCplus Backbone](#), which classifies the entire country into 11 land cover types (detailed [here](#)). Although this data was itself used as source data for classification of most ecosystem types, functionally, it served as the ‘base layer’ onto which all other data sources were ‘layered’. See Table 3 to see how this data was used to classify different ecosystem types. Altogether, it was used in the classification of nine out of 11 ecosystem types (excluding Inland Wetlands and Rivers & Streams).

2.2 Other EU data

Four other CLMS products were used for producing these accounts:

1. High-Resolution Layer – Vegetated Land Cover Characteristics (HRL-VLCC) – [Crop Types](#). This is one of the data layers produced as part of the HRL-VLCC [Croplands](#) product category, and was used as a source for Cropland ecosystem extent (Table 3). More specifically, it was used to identify areas of cropland not recorded in the Land Parcel Identification System (LPIS) database (see section on LPIS below).
2. [CORINE Land Cover](#) (CLC). Classes 243 (‘Land principally occupied by agriculture, with significant areas of natural vegetation’) and 321 (‘Natural Grassland’) were used to identify potential areas of Natural & Semi-Natural Grasslands.
3. HRL-VLCC – [Ploughing indicator](#). This is one of the data layers produced as part of the HRL-VLCC [Grasslands](#) product category. It was used to identify areas of the above CLC classes which had evidence of ploughing in the previous six years. Evidence of such precluded classification as Natural & Semi-Natural Grasslands.
4. HRL-VLCC – [Grassland Mowing Events](#). This is also one of the data layers produced as part of the HRL-VLCC Grasslands product category. It was used to identify areas of CLC classes 243 and 321 where mowing had occurred more than once within the target reference year. Evidence of such also precluded classification as Natural & Semi-Natural Grasslands.

Table 2 Geospatial data sources used to classify ecosystem extent maps for 2018 and 2021.

Data name	Source	Data type	MMU ¹	MMW ²	Reference years	Update frequency
CLCplus Backbone	Copernicus	raster	NA	NA	2018, 2021	two years
High resolution layer (HRL)-vegetated land cover characteristics (VLCC) – Crop Types	Copernicus	raster	0.25 ha	NA	2018, 2021	annual
High resolution layer (HRL)-vegetated land cover characteristics (VLCC) – Ploughing	Copernicus	raster	NA	NA	2018, 2021	annual
High resolution layer (HRL)-vegetated land cover characteristics (VLCC) – Mowing	Copernicus	raster	0.25 ha	NA	2018, 2021	annual
CORINE Land Cover (CLC)	Copernicus	raster	25 ha	100 m	2018	six years
PRIME2 - DLM Core cadastral map	Tailte Éireann	vector	0.0001 ha	0.05 m (roads) - 0.1 m (water bodies)	2018 Q1, 2021 Q4	quarterly
National Land Cover Map (NLCM)	Tailte Éireann	vector	0.01 ha to 0.05 ha	50 m for linear features	2018	six years
CSO Built Up Urban Areas	CSO	vector	6 ha	NA	2022	reviewed with every Census cycle
Counties - National Statutory Boundaries - Ungeneralised	Tailte Éireann	vector	0.0001 ha	NA	2024	ad hoc
Local Authorities - National Statutory Boundaries - Ungeneralised	Tailte Éireann	vector	0.0001 ha	NA	2024	reviewed with every Census cycle
Water Framework Directive (WFD) - Transitional Waterbodies	EPA	vector	0.1 ha	28 m	2018, 2021	six years
Land Parcel Identification System (LPIS)	DAFM	vector	0.0001 ha	NA	2018, 2021	annual
Forest administrative data (1)	DAFM	vector	0.004 ha	NA	2018, 2021	annual
Forest administrative data (2)	Coillte	vector	0.0001 ha	NA	2018, 2021	annual
National Survey of Native Woodlands (NSNW)	NPWS	vector	0.06 ha	NA	2003-2008	once-off
Ancient and Long-Established Woodland (ALEW)	NPWS	vector	0.06 ha	NA	2010	once-off
Article 17 Grasslands	NPWS	vector	0.0001 ha	NA	2019	six years

¹ minimum mapping unit (MMU). Area based spatial features (e.g. a forest) smaller than the MMU will not be represented in the data.

² minimum mapping width (MMW). Linear based features (e.g. a road or a river) with a width smaller than the MMW will not be represented in the data.

2.3 National Level data

2.3.1 PRIME 2 – DLM Core

The national cadastral map (also known as ‘PRIME 2’) from Tailte Éireann was the main data source used for mapping terrestrial ecosystem types which are primarily characterised by artificial surfaces (Settlements & Other Artificial Areas) or water (Rivers & Streams and Lakes & Ponds). To a lesser degree, it was also used to classify ecosystems which are partly characterised by exposed rock (Sparsely Vegetated Ecosystems and Coastal Beaches, Dunes & Wetlands). PRIME 2 was not used directly – instead, the [Digital Landscape Models \(DLM\) Core Data](#) was used, which is derived from it. A breakdown of how PRIME 2 was used is provided in Table 3.

2.3.2 National Land Cover Map (NLCM)

The 2018 National Land Cover Map ([NLCM](#)) – produced by the Environmental Protection Agency (EPA) and Tailte Éireann – was a key data source used for the classification of several ecosystem types (Table 3). It was the only data source for Inland Wetlands and an integral source for the classification of Heathland & Shrub, Sparsely Vegetated Ecosystems, Marine Inlets & Transitional Waters, and Coastal Beaches, Dunes & Wetlands.

2.3.3 Land Parcel Identification System (LPIS)

The Land Parcel Identification System ([LPIS](#)) database, which contains crop type descriptions for over 1.3 million farm parcels, was used to classify both Grassland and Cropland ecosystem types (Table 3). LPIS is used by the Department of Agriculture, Food and the Marine (DAFM) to administer payments to farmers under area-based schemes such as the Basic Income Support for Sustainability (BISS), and the Areas of Natural Constraint Scheme (ANC).

2.3.4 Article 17 – EU Habitats Directive data

The National Parks & Wildlife Service (NPWS) maps habitats for reporting under Article 17 of the EU Habitats Directive. [Maps](#) for the natural and semi-natural grasslands (Calaminarian grassland, Orchid-rich calcareous grassland, Species-rich Nardus upland grassland, Molinia meadows, Hydrophilous tall herb, Lowland hay meadows) reported on under this Article were classified as the Natural & Semi-Natural Grassland ecosystem type. However, like with the areas of this ecosystem type derived from CLC, they were first qualified using the CLMS ploughing and mowing data as described above.

2.3.5 Forest administrative data

Administrative data from the Department of Agriculture, Food and the Marine (DAFM) and Coillte were used as the main data sources for different Forest & Woodland ecosystem types.

2.3.6 Forest survey data

Two forest survey datasets from the NPWS were used as data sources for Broadleaved Deciduous Forest. These were the National Survey of Native Woodlands ([NSNW](#)) and the Ancient and Long-established Woodland ([ALEW](#)) survey.

2.3.7 EU Water Framework Directive transitional waters

The Transitional Waterbodies [data](#) reported by the Environmental Protection Agency (EPA) under the Water Framework Directive (WFD) were used as data sources for Coastal Lagoons and Estuaries & Bays

2.4 Boundaries

2.4.1 Ecosystem Accounting Area

To ensure ecosystem extent account comparability between reference years (e.g. 2018 to 2021), it was necessary to define a permanent Ecosystem Accounting Area (EAA) in which to map and account for the spatial extent of terrestrial and transitional ecosystems. The EAA boundary applied here was produced to delineate separately a terrestrial-transitional EAA from a marine EAA, which should be ‘wall-to-wall’ with one another. The production of these EAAs can be broken down into two general steps:

- 1) Firstly, the terrestrial EAA was delineated using the 2023 version of the high-water mark (HWM) from Tailte Éireann. This was expanded using the spatial delineation of data corresponding to transitional ecosystem types, which included the EPA WFD transitional waters data and the ‘Coastal Sediments’, ‘Mudflats’ and ‘Saltmarsh’ land cover classes from the NLCM. The terrestrial-transitional EAA was then joined inland along the border with Northern Ireland. This was done using the [outline](#) of Northern Ireland from the Ordnance Survey of Northern Ireland (OSNI).
- 2) Secondly, the marine EAA was delineated. This was done by taking the Designated Maritime Boundary Continental Shelf from The Marine Institute ([accessible here](#)) and extending it to include the Agreed [boundary](#) for Offshore Renewable Energy development between Ireland and Northern Ireland. The latter boundary stops at the entrance to Lough Foyle and Carlingford Lough. Where the joint boundaries stopped at the entrances to both loughs, a perpendicular line was drawn to the HWM. This line closed off the marine EAA and ‘clipped out’ any portion of the terrestrial-transitional EAA which extended into both loughs.

Therefore, the EAA boundary used here was the terrestrial-transitional EAA part of a composite geospatial dataset which also included – and is wall-to-wall with – the marine EAA. It is important to note that the EAA was defined for statistical purposes only – it in no way purports to define a boundary to any national territory and therefore should not under any circumstances be interpreted as such. The composite EAA shapefile can be provided upon request made to ecosystems@csso.ie.

2.4.2 Coastal and inland

It was necessary to define a coastal buffer zone to classify some ecosystem types, as suggested by [Eurostat](#). For example, exposed rock from PRIME 2 was classified as Bare Rock (part of Sparsely Vegetated Ecosystems) if it occurred inland, whereas it was classified as Rocky Shores (part of Coastal Beaches, Dunes and Wetlands) if it occurred at or near the coast. In practice, the coastal buffer zone was defined as the area within 1 km of the coastline. Therefore, ‘inland’ was considered as any area more than 1 km inland from the coastline, whereas ‘coastal’ was considered as the area inclusive of the coastal buffer zone and extending to the outer extent of the terrestrial-transitional EAA. The coastline in this case was considered to be the HWM merged with the outer extent of the EPA WFD transitional waterbodies. The reason for this is that the HWM in many areas extends significantly inland (e.g. following the Upper Shannon Estuary, Limerick Dock and the Middle Suir Estuary), which would result in the potential misclassification of inland ecosystems.

2.4.3 Continuous and discontinuous urban ecosystem types

The CSO Built Up Areas ([BUAs](#)) were used to differentiate Continuous and Discontinuous Settlement Areas. The CSO BUA boundaries were produced based on PRIME 2 building counts and are used to differentiate urban from rural areas to produce Census 2022 data for urban areas. This meant that data used to classify settlement areas (e.g. CLCplus Backbone class 1 ‘sealed’ and PRIME 2 building polygons) were classified as ‘Continuous Settlement Areas’ if they occurred within BUAs or ‘Discontinuous Settlement Areas’ if they were located outside of BUAs.

2.4.4 County Local authority boundaries

Spatial disaggregation of the compiled ecosystem extent map to the level of each local authority was done using the [local authority](#) and [county](#) boundaries generated from the 2024 National Statutory Boundaries from Tailte Éireann.

Table 3 Geospatial data sources and their ecosystem type correspondence. Also included is the order in which each classified ecosystem was mapped.

Source	Source attributes	Comment	Ecosystem (Level 2)	Ecosystem (Level 1)	Within-ecosystem order ³	Overall order ⁴
WFD Transitional Waters	transitional lagoons		10.1 Coastal Lagoons	10 Marine Inlets & Transitional Waters	1	1
WFD Transitional Waters	estuaries		10.2 Estuaries & Bays	10 Marine Inlets & Transitional Waters	2	
NLCM	mudflats		10.3 Intertidal Flats	10 Marine Inlets & Transitional Waters	3	
NLCM	saltmarsh		11.4 Coastal Saltmarshes & Salines	11 Coastal Beaches, Dunes & Wetlands	1	2
None	-	data could not be sourced	11.1 Artificial Shorelines	11 Coastal Beaches, Dunes & Wetlands	2	
NLCM	sand dunes and coastal sediments		11.2 Coastal Dunes, Beaches & Sandy & Muddy Shores	11 Coastal Beaches, Dunes & Wetlands	3	
PRIME 2	cliff, rock, outcrop, scree and shingle in coastal buffer zone		11.3 Rocky Shores	11 Coastal Beaches, Dunes & Wetlands	4	
CLCplus Backbone	class 9 - non and sparsely vegetated in coastal buffer zone		11.3 Rocky Shores	11 Coastal Beaches, Dunes & Wetlands		
PRIME 2	graveyards		1.5 Other Artificial Areas	1 Settlements & Other Artificial Areas	1	3
PRIME 2	greenhouses		1.5 Other Artificial Areas	1 Settlements & Other Artificial Areas		
PRIME 2	antiquity sites		1.5 Other Artificial Areas	1 Settlements & Other Artificial Areas		
PRIME 2	railway network		1.3 Infrastructure & Industrial Areas	1 Settlements & Other Artificial Areas	2	
PRIME 2	roundabouts and verges		1.3 Infrastructure & Industrial Areas	1 Settlements & Other Artificial Areas		
PRIME 2	relevant roads		1.3 Infrastructure & Industrial Areas	1 Settlements & Other Artificial Areas		
PRIME 2	extraction sites		1.3 Infrastructure & Industrial Areas	1 Settlements & Other Artificial Areas		
PRIME 2	ports and airports		1.3 Infrastructure & Industrial Areas	1 Settlements & Other Artificial Areas		
PRIME 2	public greenspace and sports fields		1.4 Urban Greenspace	1 Settlements & Other Artificial Areas	3	

³ This is the order in which each level 2 ecosystem type (including residual land cover classes) was mapped for each level 1 ecosystem type

⁴ This is the order in which each composite level 1 ecosystem type was mapped (including residual land cover classes)

CLCplus Backbone	class 2 woody needle leaved trees within BUA and outside LPIS claimed area		1.4 Urban Greenspace	1 Settlements & Other Artificial Areas		
CLCplus Backbone	class 3 woody broadleaved deciduous trees within BUA and outside LPIS claimed area		1.4 Urban Greenspace	1 Settlements & Other Artificial Areas		
CLCplus Backbone	class 5 low-growing woody plants within BUA and outside LPIS claimed area		1.4 Urban Greenspace	1 Settlements & Other Artificial Areas		
CLCplus Backbone	class 6 permanent herbaceous within BUA and outside LPIS claimed area		1.4 Urban Greenspace	1 Settlements & Other Artificial Areas		
PRIME 2	small lakes and ponds associated with urban green		1.4 Urban Greenspace	1 Settlements & Other Artificial Areas		
PRIME 2	buildings outside BUA		1.2 Discontinuous Settlement Areas	1 Settlements & Other Artificial Areas		
PRIME 2	artificial surfaces outside BUA		1.2 Discontinuous Settlement Areas	1 Settlements & Other Artificial Areas	4	
CLCplus Backbone	class 1 sealed outside BUA		1.2 Discontinuous Settlement Areas	1 Settlements & Other Artificial Areas		
PRIME 2	buildings within BUA		1.1 Continuous Settlement Areas	1 Settlements & Other Artificial Areas		
PRIME 2	artificial surfaces within BUA		1.1 Continuous Settlement Areas	1 Settlements & Other Artificial Areas	5	
CLCplus Backbone	class 1 sealed within BUA		1.1 Continuous Settlement Areas	1 Settlements & Other Artificial Areas		
LPIS, HRL-VLCC Crop type, CLCplus Backbone	highly heterogenous LPIS parcels based on land cover and crop type variation		2.5 Mixed Farmland	2 Cropland	1	
None	-	data could not be sourced	2.4 Agro-forestry	2 Cropland	2	
LPIS	permanent crops		2.3 Permanent Cropland	2 Cropland		
HRL-VLCC Crop type	permanent crops		2.3 Permanent Cropland	2 Cropland	3	
-	-	this ecosystem type does not occur in Ireland	2.2 Rice Fields	2 Cropland	4	4
LPIS	annual crops		2.1 Annual Cropland	2 Cropland		
HRL-VLCC Crop type	annual crops		2.1 Annual Cropland	2 Cropland	5	
CLCplus Backbone	class 7 periodically herbaceous		2.1 Annual Cropland	2 Cropland		
LPIS	other crops		2.6 Other Farmland	2 Cropland	6	
Coillte forests	forests with 75% or more canopy coverage of non-native conifer		4.6 Plantations	4 Forest & Woodland	1	5
DAFM forests	forests with 75% or more canopy coverage of non-native conifer		4.6 Plantations	4 Forest & Woodland		

Coillte forests	temporarily unstocked forest sites	4.5 Transitional Forest & Woodland Shrub	4 Forest & Woodland	2	6	
DAFM forests	temporarily unstocked forest sites	4.5 Transitional Forest & Woodland Shrub	4 Forest & Woodland			
Coillte forests	forests where neither broadleaved deciduous nor conifer trees have a canopy cover of 75% or more	4.4 Mixed Forests	4 Forest & Woodland	3		
DAFM forests	forests where neither broadleaved deciduous nor conifer trees have a canopy cover of 75% or more	4.4 Mixed Forests	4 Forest & Woodland			
Coillte forests	forests with 75% or more canopy coverage of broadleaved deciduous species native to Europe	4.3 Broadleaved Evergreen Forest	4 Forest & Woodland	4		
DAFM forests	forests with 75% or more canopy coverage of broadleaved deciduous species native to Europe	4.3 Broadleaved Evergreen Forest	4 Forest & Woodland			
Coillte forests	forests with 75% or more canopy coverage of Scots pine	4.2 Coniferous Forest	4 Forest & Woodland	5		
DAFM forests	forests with 75% or more canopy coverage of Scots pine	4.2 Coniferous Forest	4 Forest & Woodland			
Coillte forests	broadleaved deciduous forest sites	4.1 Broadleaved Deciduous Forest	4 Forest & Woodland	6		
DAFM forests	broadleaved deciduous forest sites	4.1 Broadleaved Deciduous Forest	4 Forest & Woodland			
NSNW	all forest sites	4.1 Broadleaved Deciduous Forest	4 Forest & Woodland			
ALEW	all forest sites	4.1 Broadleaved Deciduous Forest	4 Forest & Woodland			
PRIME 2	canals, ditches and drains	8.2 Canals, Ditches & Drains	8 Rivers & Canals	1	7	
PRIME 2	rivers and streams	8.1 Rivers & Streams	8 Rivers & Canals	2		
-	-	this ecosystem type does not occur in Ireland	9.3 Geothermal Pools & Wetlands (Iceland)	9 Lakes & Reservoirs		1
PRIME 2	reservoirs	9.2 Artificial Reservoirs	9 Lakes & Reservoirs	2		
PRIME 2	lakes and ponds	9.1 Lakes & Ponds	9 Lakes & Reservoirs			
CLCplus Backbone	class 10 water inland of coastal buffer zone	CLCplus Backbone for 2021 contains an additional class (253; 'coastal seawater buffer'). This is a reclassification of the coastal part of class 10. For consistency, class 253 is included here for 2021.	9.1 Lakes & Ponds	9 Lakes & Reservoirs	3	

NLCM	peatlands		7.2 Mires, Bogs & Fens	7 Inland Wetlands	1	8
NLCM	swamp		7.1 Inland Marshes & Other Wetlands on Mineral Soil	7 Inland Wetlands	2	
-	-	this ecosystem type does not occur in Ireland	5.3 Sclerophyllous Vegetation	5 Heathland & Shrub	1	9
NLCM	heathland and bracken		5.2 Scrub & Heathland	5 Heathland & Shrub	2	
CLCplus Backbone	class 5 low-growing woody plants		5.2 Scrub & Heathland	5 Heathland & Shrub		
-	-	this ecosystem type does not occur in Ireland	5.1 Tundra	5 Heathland & Shrub	3	
PRIME 2	exposed rock inland of coastal buffer zone		6.1 Bare Rocks	6 Sparsely Vegetated Ecosystems	1	10
NLCM	exposed rock and sediments		6.1 Bare Rocks	6 Sparsely Vegetated Ecosystems		
NLCM	bare soil and disturbed ground		6.2 Semi-Desert, Desert & Other Sparsely Vegetated Areas	6 Sparsely Vegetated Ecosystems	2	
CLCplus Backbone	non and sparsely vegetated inland of coastal buffer zone		6.2 Semi-Desert, Desert & Other Sparsely Vegetated Areas	6 Sparsely Vegetated Ecosystems		
-	-	this ecosystem type does not occur in Ireland	6.3 Ice Sheets, Glaciers & Perennial Snowfields	6 Sparsely Vegetated Ecosystems	3	
Article 17 Grasslands, HRL-VLCC Ploughing, HRL-VLCC Mowing	Calaminarian grassland, Orchid-rich calcareous grassland, Species-rich Nardus upland grassland, Molinia meadows, Hydrophilous tall herb, Lowland hay meadows	grassland included if no ploughing in preceding six year and no mowing more than once in reference year	3.2 Natural & Semi-Natural Grasslands	3 Grassland	1	11
CLC	classes 243 and 321	grassland included if no ploughing in preceding six year and no mowing more than once in reference year	3.2 Natural & Semi-Natural Grasslands	3 Grassland		
LPIS	intensive agriculture grassland		3.1 Sown Pastures & Other Grass	3 Grassland		
CLCplus Backbone	class 6 permanent herbaceous		3.1 Sown Pastures & Other Grass	3 Grassland	2	
NLCM	intensive agriculture grassland		3.1 Sown Pastures & Other Grass	3 Grassland		
CLCplus Backbone	class 10 water within and beyond coastal buffer zone	water located within and beyond 1 km coastal buffer; for 2021 onward, class 253 (coastal seawater buffer) is included here	10.3 Intertidal Flats	10 Marine Inlets & Transitional Waters	1	12
CLCplus Backbone	class 3 woody broadleaved deciduous trees		4.1 Broadleaved Deciduous Forest	4 Forest & Woodland		

3 Ecosystem classification and mapping

3.1 Data preparation

A number of pre-processing steps were necessary in order to compile and merge the wide range of different source data used to produce the final ecosystem extent map. Firstly, CLCplus Backbone – the base land cover map onto which all other data were layered – was clipped to the terrestrial-transitional EAA, as land cover outside the defined EAA was not relevant. Then, all other source data were formatted to ensure compatibility with CLCplus Backbone. This primarily related to all national data, and included two main steps:

1. The national data were generally all structured (or ‘projected’) to an Irish-specific coordinate reference system ([CRS](#)). Typically, this was the Irish Transverse Mercator (ITM)/ [EPSG:2157](#). By contrast, the EU data (including CLCplus Backbone) are projected to the European LAEA projection/ [EPSG:3035](#). The national data were re-projected to EPSG:3035, which is an equal-area projection making it superior for statistical mapping for cross-continental comparison.
2. The national data were all [vector](#) based, meaning they detailed the exact dimensions of real world features such as fields, forests and rivers. These data appear as polygons when mapped and are created using multiple points connected by lines. The EU data sources are instead produced as [raster](#) images. A raster image is a grid of cells (all the same size) containing values, which in this case correspond to labels (e.g. different types of crops or land cover). It is worth noting that this type of data is inherently less accurate – as real-world features are rarely perfectly square – but it is a more straight-forward data structure and conducive for layering multiple geospatial datasets. Therefore, it was necessary to convert all national data from vector to raster format. The resolution (i.e. cell size) of the raster data (and the final compiled source map) was 10 × 10 m.

3.2 Workflow

Classification of each ecosystem type was done in an iterative manner whereby a separate map was produced for each level two ecosystem type. Each iteration can be simplified into three steps:

1. Map source data (e.g. annual crops from LPIS) – including re-projection and conversion from vector to raster format (if necessary)
2. Give level two ecosystem classification (e.g. ET2.1 Annual Cropland)
3. Give level one ecosystem classification (e.g. ET2 Cropland)

After classifying and mapping all level two ecosystem types for a given level one ecosystem type, all level two ecosystem type maps were then merged into a level one ecosystem type map. For example, such a map for the level one ecosystem type ‘Cropland’ includes the spatial extent of its respective level two ecosystem types (for Ireland, this includes ‘Annual Cropland’, ‘Permanent Cropland’ and ‘Other Farmland’). This is then repeated for the next ecosystem type (i.e. mapping of level two Grassland ecosystem types, then merging to a level one classification). After all ecosystem types were classified, each level one ecosystem type map was then merged into the final ecosystem extent map. This overall process is illustrated in Figure 1.

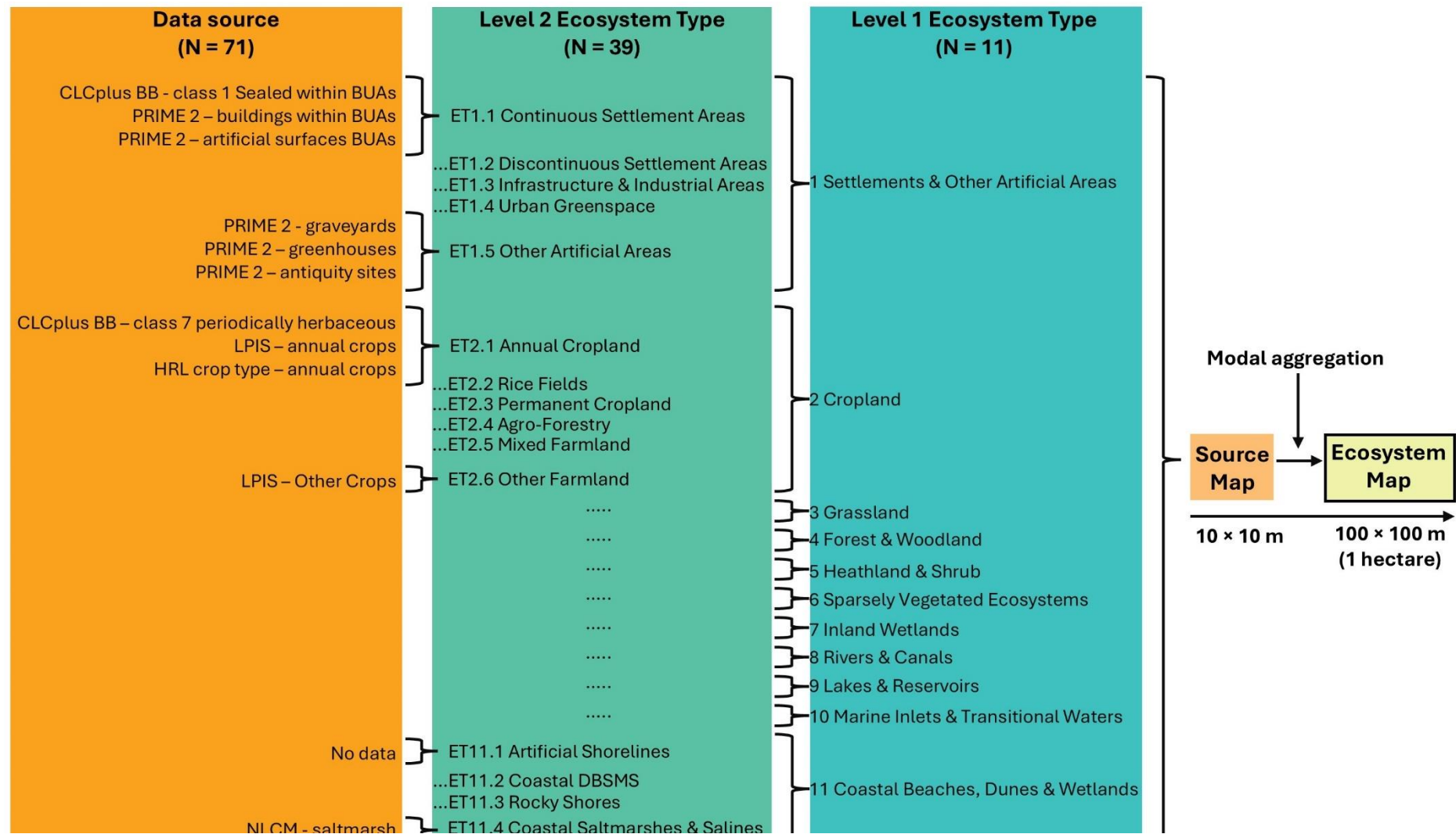


Figure 1 Overview of ecosystem classification and mapping workflow

3.2.1 Data merging

Merging of level two (and subsequently level one) ecosystem type maps involves successive ‘layering’ of each map on top of the next. This can also be thought of as ‘gap-filling’, whereby the first map is added to a blank canvas after which the next is used to fill gaps in the previous. The final order of each ecosystem type map, as determined by the source data, is given in Table 3. The order of each map depends on three main attributes of the source data, including the year for which the data refers (i.e. data age), the degree of correspondence between the source data and the ecosystem type definition, and accuracy (i.e. expected level of error in the source data). An example of each is given below:

3.2.1.1 Data age

The National Survey of Native Woodlands (NSNW; 2003-2008) maps the extent of a range of broadleaved deciduous forests across Ireland – this data can be used to classify the level two ecosystem type ‘Broadleaved Deciduous Forest’. However, administrative forest data from Coillte and DAFM provide the extent of plantation forests around the country for 2018 – this data can be used to classify the level two ecosystem type ‘Plantations’. In this case, because Broadleaved Deciduous Forest includes data from as far back as 2003, it *gap-fills* the Plantations ecosystem type. If they were mapped the other way around, it would risk the final ecosystem extent map not capturing forest sites which had been converted from broadleaved deciduous forest into plantation forestry.

3.2.1.2 Data correspondence

The National Land Cover Map (NLCM) maps the total extent of peatlands in Ireland for 2018. This can be classified directly as the level two ecosystem type ‘Mires, Bogs & Fens’. Separately, the ‘non and sparsely vegetated’ land cover class from CLCplus BackBone gives the spatial extent of all permanently bare and sparsely vegetated soil surfaces in Ireland for 2021. This has correspondence to the level two ecosystem type ‘Semi-Desert, Desert & Other Sparsely Vegetated Areas’. However, ‘non and sparsely vegetated’ land cover would also include large areas of bare peat and cutover bog. Therefore, even though the peatland data is older, a greater error can be expected if the level two ecosystem type ‘Sparsely Vegetated Ecosystems’ was gap-filled with the level one ecosystem type ‘Inland Wetlands’. This is because – given their respective source data – it would likely result in large areas of Inland Wetlands being incorrectly classified as Sparsely Vegetated Ecosystems.

3.2.1.3 Data accuracy

The Land Parcel Identification System (LPIS) provides most of the extent of ‘permanent pasture’ (as declared by farmers) in Ireland for 2021. This land can be classified as the level two ecosystem type ‘Sown Pastures & Other Grass’. However, some LPIS parcels bearing this description can include relatively large areas of heathland and bracken which should be classified as the level two ecosystem type ‘Scrub & Heathland’. This may be particularly true for larger LPIS land parcels, which may be more likely to include areas of commonage. In this case, Sown Pastures & Other Grass would be classified using data with a known degree of error from 2021. By contrast, Scrub & Heathland is classified using heathland and bracken land cover data from 2018 with no comparable level or error. Therefore, the level one ecosystem type ‘Heathland & Shrub’ is gap-filled by the level one ecosystem type ‘Grassland’ to avoid large areas of Scrub & Heathland being misclassified as Sown Pastures & Other Grass.

3.2.2 Residual land cover

Four CLCplus Backbone classes were not completely classified whilst iterating through each ecosystem type. These are areas which were not covered by any national data, and the reason for the *post hoc* classification of each are as follows:

3.2.2.1 Class 2 – *woody needle leaved trees*

This class can include planted tree lines, which should generally be considered as part of their surrounding ecosystem type. For example, a row of Monterey cypress trees planted at the edge of a field of barley should be considered as part of the Cropland ecosystem type and not classified as Forest & Woodland. Classification of residual areas of this land cover type after classifying all other source data ensures that only relatively large areas of this landcover type are classified as Forest & Woodland (or Plantation at level two).

3.2.2.2 Class 3 – *woody broadleaved deciduous trees*

This follows the same logic as for class 2 – woody needle leaved trees (above).

3.2.2.3 Class 7 – *periodically herbaceous*

The class is intended to correspond to arable land cover. However, it was observed to occur in small patches of cutover bog. Therefore, to avoid characterisation of some peatland areas as Cropland, *post hoc* classification of this land cover as Annual Cropland was necessary.

3.2.2.4 Class 10 – *water*

This relates only to where this class occurs in coastal areas (i.e. within the coastal buffer zone and extending to the outer extent of the terrestrial-transitional EAA). It also applies to class 253 – ‘coastal seawater buffer’ which is present in the 2021 version of CLCplus Backbone but not the 2018 version. Residual areas of this land cover type are classified as the level two ecosystem type Intertidal Flats. Applying this classification earlier could result in misclassification of waterbodies (e.g. rivers or ponds) which occur within the coastal buffer zone. Similarly, ecosystems such as Estuaries & Bays would also be misclassified.

3.2.3 Finalisation of ecosystem extent map

The result of classifying all ecosystem types based on the different source data was a compiled map with a resolution of 10 × 10 m. To better account for the scale at which ecosystems occur, it was necessary to aggregate to a resolution 100 × 100 m (1 hectare). The rationale for this may be better understood with the below examples.

1. Linear features such as tree lines are represented in the land cover data at 10 × 10 m. However, it would be incorrect to classify these as the Forest & Woodland ecosystem type – instead, tree lines should be considered as part of the broader ecosystem context (e.g. Cropland, Grassland or Urban Greenspace). Aggregation to 1 hectare controls against such classifications, thereby reducing error.
2. Small bodies of water, which could be as small as 10 m², would be incorrectly classified as the Lake & Ponds ecosystem type. However, as with small linear features, such small landscape features which are observable as areal phenomena should also be considered as part of the broader ecosystem type. For example, a small pond in the corner of a field of pasture or on a large area of blanket bog should be considered part of Grassland or Inland Wetlands ecosystem types, respectively.
3. Small roads and trails (e.g. through forests, farms or rural roads intersecting agricultural landscapes) should also be considered (and mapped) as part of their broader ecosystem

contexts. By contrast, large roads such as motorways should be classified as the level two ecosystem type ‘Infrastructure & Industrial Areas’. As the road network (from PRIME 2) was mapped as part of the source data, aggregation to 1 hectare means that only large areas of road are represented in the final ecosystem map.

The aggregation statistic used was the mode, meaning that the final ecosystem type label corresponded to the most common ecosystem type per hectare, as suggested by the source data. Where two ecosystem types were equally frequent, the label assigned was that of the first encountered value – this can be regarded as random. See Figure 2 for an illustration of the conversion between the source land cover map and the final ecosystem map.

3.2.4 Complex ecosystem types

3.2.4.1 Urban Greenspace

This ecosystem type is defined as ‘areas with vegetation within or partly embraced by urban fabric’. Furthermore, it is assumed to be ‘urban greenery’ with ‘recreational or ornamental character’, is ‘usually’ publicly accessible and includes ‘small urban water bodies’. It also includes sports facilities (e.g. GAA pitches and golf courses) which occur within or outside of built-up urban environments. Classification of this ecosystem type can be split into two parts:



Figure 2 Conversion from source land cover map to final ecosystem extent map.

- 1) Classification of urban green: This includes all relevant ‘green’ land cover classes from CLCplus Backbone (as indicated in Table 3) occurring within BUAs. However, such land cover was excluded if it was within a LPIS land parcel, as this would suggest agricultural land use – meaning it should be mapped as Cropland or Sown Pastures & Other Grass. For example, some areas of land were described as ‘permanent pasture’ in LPIS, indicating agricultural usage. This land was therefore classified as Sown Pastures & Other Grass instead of Urban Greenspace. In addition to the above, sports fields and field allotments as mapped in PRIME 2 were also classified as Urban Greenspace, regardless of occurrence within a BUA.
- 2) Classification of urban blue: Eurostat defines ‘urban blue’ as ‘lakes or substantial ponds in urban parks, or water bodies in settlements used for recreation’. They recommend that it should be classified as Urban Greenspace if it is adjacent to urban green (as defined above) *and* is smaller than the MMU (i.e. 1 ha). If nonadjacent to urban green and smaller than the MMU, then it is not mapped, whereas if nonadjacent and larger than the MMU, then it is mapped and classified as the level two ecosystem type ‘Lakes & Ponds’. This was the approach taken here, with lakes and ponds being those labelled as such in PRIME 2.

4 Validation and accuracy

4.1 Accuracy of source land cover map

At the time of publication, no suitable geospatial data were available to independently validate the classified ecosystem extent maps produced for these accounts. However, the Land Use-Land Cover Area Frame Survey ([LUCAS](#)) sample points published by Eurostat were used to estimate the accuracy of the compiled source land cover map.

4.1.1 Validation using Land Cover Area Frame Survey (LUCAS)

LUCAS ‘is a harmonised *in situ* land cover and land use data collection exercise that extends over the whole of the EU’s territory’. It employs a rigorous, stratified sampling process to select probabilistic sample points from across a 2 km grid. These are then surveyed during *in situ* field visits and using photointerpretation, with information on land cover recorded for eight possible land cover categories (broken down into 29 classes and 76 subclasses). The survey is repeated every three years and includes 4,976 and 8,597 sample points for Ireland in 2018 and 2022, respectively.

Although the LUCAS land cover classes generally correspond to the mapped source data classes, this was not always the case. Therefore, to harmonise both datasets and ensure complete comparability, the LUCAS classes and mapped ecosystem source data classes were given an intermediate, high-level classification (Figure 3). The application of this 10-class classification for each LUCAS subclass and source data attribute is given Tables 4 and 5, respectively. After applying the common classification to both data, the LUCAS sample points were intersected with the ecosystem source data map. From this, a confusion matrix was produced. This tabulated how many times each LUCAS point had the same land cover classification as the source data map. This was done for each of the 10 intermediate land cover classes and was used to produce different estimates of accuracy (Figure 4).

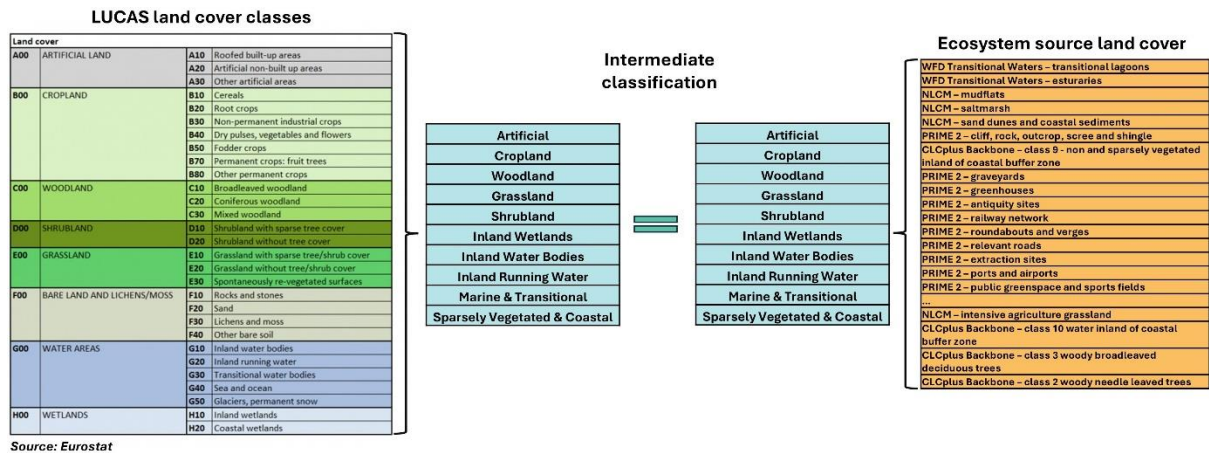


Figure 3 Illustration of intermediate land cover classification used to harmonise LUCAS and ecosystem source land cover data.

Table 4 Crosswalk between LUCAS land cover subclasses and the intermediate classification used for validation.

LUCAS class	LUCAS class description	LUCAS classification
A11	Buildings with 1 to 3 floors	Artificial
A12	Buildings with more than 3 floors	Artificial
A13	Greenhouses	Artificial
A21	Non built-up area features	Artificial
A22	Non built-up linear features	Artificial
A30	Other artificial areas	Artificial
B11	Common wheat	Cropland
B12	Durum wheat	Cropland
B13	Barley	Cropland
B14	Rye	Cropland
B15	Oats	Cropland
B16	Maize	Cropland
B17	Rice	Cropland
B18	Triticale	Cropland
B19	Other cereals	Cropland
B21	Potatoes	Cropland
B22	Sugar beet	Cropland
B23	Other root crops	Cropland
B31	Sunflower	Cropland
B32	Rape and turnip rape	Cropland
B33	Soya	Cropland
B34	Cotton	Cropland
B35	Other fibre and oleaginous crops	Cropland
B36	Tobacco	Cropland
B37	Other non-permanent industrial crops	Cropland
B41	Dry pulses	Cropland
B42	Tomatoes	Cropland

B43	Other fresh vegetables	Cropland
B44	Floriculture and ornamental plants	Cropland
B45	Strawberries	Cropland
B51	Clovers	Cropland
B52	Lucerne	Cropland
B53	Other leguminous and mixtures for fodder	Cropland
B54	Mixed cereals for fodder	Cropland
B55	Temporary grasslands	Cropland
B71	Apple fruit	Cropland
B72	Pear fruit	Cropland
B73	Cherry fruit	Cropland
B74	Nuts trees	Cropland
B75	Other fruit trees and berries	Cropland
B76	Oranges	Cropland
B77	Other citrus fruit	Cropland
B81	Olive groves	Cropland
B82	Vineyards	Cropland
B83	Nurseries	Cropland
B84	Permanent industrial crops	Cropland
Bx1	Arable land (only PI)	Cropland
Bx2	Permanent crops (only PI)	Cropland
C10	Broadleaved woodland	Woodland
C21	Spruce dominated coniferous woodland	Woodland
C22	Pine dominated coniferous woodland	Woodland
C23	Other coniferous woodland	Woodland
C31	Spruce dominated mixed woodland	Woodland
C32	Pine dominated mixed woodland	Woodland
C33	Other mixed woodland	Woodland
D10	Shrubland with sparse tree cover	Shrubland
D20	Shrubland without tree cover	Shrubland
E10	Grassland with sparse tree/shrub cover	Grassland
E20	Grassland without tree/shrub cover	Grassland
E30	Spontaneously vegetated surfaces	Sparsely Vegetated & Coastal
F10	Rocks and stones	Sparsely Vegetated & Coastal
F20	Sand	Sparsely Vegetated & Coastal
F30	Lichens and moss	Sparsely Vegetated & Coastal
F40	Other bare soil	Sparsely Vegetated & Coastal
G11	Inland fresh water bodies	Inland Water Bodies
G12	Inland salty water bodies	Marine & Transitional
G21	Inland fresh running water	Inland Running Water
G22	Inland salty running water	Marine & Transitional
G30	Transitional water bodies	Marine & Transitional
G40	Marine sea	Marine & Transitional
G50	Glaciers, permanent snow	NA
H11	Inland marshes	Inland Wetlands
H12	Peatbogs	Inland Wetlands

H21	Salt marshes	Sparsely Vegetated & Coastal
H22	Salines and other chemical deposits	Sparsely Vegetated & Coastal
H23	Intertidal flats	Marine & Transitional

Table 5 Crosswalk between source data attributes used for ecosystem classification and the intermediate classification used for validation against LUCAS land cover subclasses.

Source	Source attributes	LUCAS classification
WFD Transitional Waters	transitional lagoons	Marine & Transitional
WFD Transitional Waters	estuaries	Marine & Transitional
NLCM	mudflats	Marine & Transitional
NLCM	saltmarsh	Sparsely Vegetated & Coastal
NLCM	sand dunes and coastal sediments	Sparsely Vegetated & Coastal
PRIME 2	cliff, rock, outcrop, scree and shingle	Sparsely Vegetated & Coastal
CLCplus Backbone	class 9 - non and sparsley vegetated inland of coastal buffer zone	Sparsely Vegetated & Coastal
PRIME 2	graveyards	Artificial
PRIME 2	greenhouses	Artificial
PRIME 2	antiquity sites	Artificial
PRIME 2	railway network	Artificial
PRIME 2	roundabouts and verges	Artificial
PRIME 2	relevant roads	Artificial
PRIME 2	extraction sites	Artificial
PRIME 2	ports and airports	Artificial
PRIME 2	public greenspace and sports fields	Grassland
CLCplus Backbone	class 2 woody needle leaved trees within BUA and outside LPIS claimed area	Woodland
CLCplus Backbone	class 3 woody broadleaved deciduous trees within BUA and outside LPIS claimed area	Woodland
CLCplus Backbone	class 5 low-growing woody plants within BUA and outside LPIS claimed area	Shrubland
CLCplus Backbone	class 6 permanent herbaceous within BUA and outside LPIS claimed area	Grassland
PRIME 2	small lakes and ponds associated with urban green	Inland Water Bodies
PRIME 2	buildings outside BUA	Artificial
PRIME 2	artificial surfaces outside BUA	Artificial

CLCplus Backbone	class 1 sealed outside BUA	Artificial
PRIME 2	buildings within BUA	Artificial
PRIME 2	artificial surfaces within BUA	Artificial
CLCplus Backbone	class 1 sealed within BUA	Artificial
LPIS, HRL-VLCC Crop type, CLCplus Backbone	highly heterogenous LPIS parcels based on land cover and crop type variation	Cropland
LPIS	permanent crops	Cropland
HRL-VLCC Crop type	permanent crops	Cropland
LPIS	annual crops	Cropland
HRL-VLCC Crop type	annual crops	Cropland
CLCplus Backbone	class 7 periodically herbaceous	Cropland
LPIS	other crops	Cropland
Coillte forests	forests with 75% or more canopy coverage of non-native conifer	Woodland
DAFM forests	forests with 75% or more canopy coverage of non-native conifer	Woodland
Coillte forests	temporarily unstocked forest sites	Woodland
DAFM forests	temporarily unstocked forest sites	Woodland
Coillte forests	forests where neither broadleaved deciduous nor conifer trees have a canopy cover of 75% or more	Woodland
DAFM forests	forests where neither broadleaved deciduous nor conifer trees have a canopy cover of 75% or more	Woodland
Coillte forests	forests with 75% or more canopy coverage of broadleaved deciduous species native to Europe	Woodland
DAFM forests	forests with 75% or more canopy coverage of broadleaved deciduous species native to Europe	Woodland
Coillte forests	forests with 75% or more canopy coverage of Scots pine	Woodland
DAFM forests	forests with 75% or more canopy coverage of Scots pine	Woodland
Coillte forests	broadleaved deciduous forest sites	Woodland
DAFM forests	broadleaved deciduous forest sites	Woodland
NSNW	all forest sites	Woodland
ALEW	all forest sites	Woodland
PRIME 2	canals, ditches and drains	Inland Running Water
PRIME 2	rivers and streams	Inland Running Water
PRIME 2	reservoirs	Inland Water Bodies
PRIME 2	lakes and ponds	Inland Water Bodies
CLCplus Backbone	class 10 water inland of coastal buffer zone	Inland Water Bodies
NLCM	peatlands	Inland Wetlands
NLCM	swamp	Inland Wetlands
NLCM	heathland and bracken	Shrubland
CLCplus Backbone	class 5 low-growing woody plants	Shrubland
PRIME 2	exposed rock inland of coastal buffer zone	Sparsely Vegetated & Coastal

NLCM	exposed rock and sediments	Sparsely Vegetated & Coastal
NLCM	bare soil and disturbed ground	Sparsely Vegetated & Coastal
CLCplus Backbone	non and sparsley vegetated inland of coastal buffer zone	Sparsely Vegetated & Coastal
Article 17 Grasslands, HRL-VLCC Ploughing, HRL-VLCC Mowing	Calaminarian grassland, Orchid-rich calcareous grassland, Species-rich Nardus upland grassland, Molinia meadows, Hydrophilous tall herb, Lowland hay meadows	Grassland
CLC	classes 243 and 321	Grassland
LPIS	intensive agriculture grassland	Grassland
CLCplus Backbone	class 6 permanent herbaceous	Grassland
NLCM	intensive agriculture grassland	Grassland
CLCplus Backbone	class 10 water inland of coastal buffer zone	Marine & Transitional
CLCplus Backbone	class 3 woody broadleaved deciduous trees	Woodland
CLCplus Backbone	class 2 woody needle leaved trees	Woodland

4.1.1.1 Accuracy results

The accuracy of the source land cover map was class-dependent (Table 6). Generally, accuracy was highest for Grassland, Cropland, Woodland and Inland Water Bodies. By contrast, Marine & Transitional and Inland Running Water had F1 scores of zero for 2018. This is almost certainly due to the low number of LUCAS sample points available for 2018, as F1 values were moderate for 2021 when there were more sample points.

Shrubland and Sparsely Vegetated & Coastal were low for 2018 and 2021. Reasons for this are not clear, but they could be explained by low source data accuracy or poor correspondence between the source data land cover and the LUCAS land cover classes. Generally, compared to vector data, validation of raster data using points should always give lower accuracy estimates due to the error introduced when rasterising (i.e. generalising an irregular shape to square area). Furthermore, a 10 × 10 m raster pixel is given the label of the underlying vector if it crosses the centre point of the pixel. For linear vectors in particular (e.g. a road or a stream), a 10 m² pixel may therefore only share a minority portion of its area with the underlying source data.

Overall, kappa – a measure of overall agreement adjusted for random chance (Figure 4) – for the 2018 and 2021 source maps was 0.6238 and 0.5545, respectively (Table 7). These indicate that the source land cover maps were substantially to moderately accurate. The lower estimate for 2021 may be due to some of the source data from 2018 being reused rather than updated for 2021. For example, the source data for Inland Wetlands was the NLCM from 2018 (the only version of the NLCM to date), and F1 for this class dropped from 0.6454 for 2018 to 0.3982 for 2021. However, it must also be noted that the accuracy estimates for the 2021 source land cover should generally be regarded as more accurate given that there were an additional 3,597 LUCAS sample points used for validation in 2021 compared to 2018 (a 72% increase). See below section on the likely sources of error introduced from the different source data.

		LUCAS	
		Grassland - yes	Grassland - no
Source land cover	Grassland - yes	True positive (TP)	False positive (FP)
	Grassland - no	False negative (FN)	True negative (TN)

Class specific (e.g. Cropland, Grassland, Shrubland)

$User\ accuracy = \frac{TP}{TP+FP}$	Of all mapped Grassland , how many are Grassland based on LUCAS?
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$Producer\ accuracy = \frac{TP}{TP+FN}$	Of all Grassland in LUCAS, how many were correctly mapped?
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$F1 = 2 \times \frac{User\ accuracy \times Producer\ accuracy}{User\ accuracy + Producer\ accuracy}$	Combines user and producer accuracy into single balanced metric for Grassland
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Overall (i.e. across all classes)

$Cohen's\ kappa = \frac{P_o - P_e}{1 - P_e}$	Considers <i>TN</i> when calculating observed (P_o) and expected (P_e) agreement between all classes in LUCAS and the source land cover. Accounts for possibility of agreement by chance, which is higher for imbalanced data (e.g. extent of different ecosystems)
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Figure 4 Accuracy statistics used to validate the source land cover map used for ecosystem classification.

Table 6 Accuracy statistics for each LUCAS validation land cover class based on agreement with the source land cover maps used for mapping ecosystem extent in 2018 and 2021.

LUCAS classification	Number of LUCAS sample points		User accuracy		Producer accuracy		F1 Score	
	2018	2021	2018	2021	2018	2021	2018	2021
Artificial	298	426	0.59	0.53	0.69	0.58	0.64	0.55
Cropland	338	731	0.71	0.73	0.88	0.87	0.79	0.80
Woodland	866	859	0.81	0.70	0.71	0.61	0.75	0.66
Grassland	2740	4609	0.82	0.81	0.85	0.80	0.83	0.80
Shrubland	326	1089	0.44	0.53	0.29	0.32	0.35	0.40
Inland Wetlands	276	295	0.60	0.27	0.70	0.74	0.65	0.40
Inland Water Bodies	11	305	0.73	0.94	0.80	0.95	0.76	0.94
Inland Running Water	8	40	0.11	0.34	0.50	0.58	0.18	0.43
Marine & Transitional	1	13	0.00	0.60	0.00	0.75	0.00	0.67
Sparsely Vegetated & Coastal	107	201	0.27	0.31	0.10	0.19	0.15	0.24

Table 7 Overall accuracy statistics based on validation of source land cover map using LUCAS sample points.

Statistic	Value	
	2018	2021
Accuracy	0.7539	0.7002
95% CI	[0.7416, 0.7658]	[0.6904, 0.7099]
No Information Rate ⁵	0.5514	0.5383
P-value [Accuracy > No Information Rate] ⁶	<0.001	<0.001
Kappa	0.6178	0.5599
Number of validation sample points	4976	8597

4.1.2 Possible sources of error

4.1.2.1 National Land Cover Map

The NLCM was a key data source used for ecosystem classification. However, it comes with overall kappa estimates of 0.862 and 0.774 for its level one and two land cover classes, respectively (see NLCM report [here](#)). Therefore, this error would have transferred to the source land cover map. Moreover, this error should increase over time, meaning that it should be higher when used for compilation of the 2021 source land cover map.

4.1.2.2 CLCplus Backbone

Overall accuracies reported for Ireland for the 2018 and 2021 CLCplus Backbone versions were 0.914 and 0.966. Although these are higher than reported for the NLCM, CLCplus Backbone raster

⁵ Accuracy if every source land cover pixel was the most frequent class (i.e. Grassland). If same as accuracy, then the source map may be regarded as completely inaccurate.

⁶ If greater than 0.05, the source map accuracy is not significantly greater than the No Information Rate.

products are relatively new and have not yet been subject to a rigorous external and independent validation process against other statistics. It also must be noted here that the areas for classes 2 ('woody needle leaved trees') and 3 ('woody broadleaved deciduous trees') were higher in Ireland for 2018 compared to 2021 – there were 5% and 10% more pixels for these classes (respectively) in 2018. This would suggest a decrease in Forest & Woodland from 2018 to 2021, which is not consistent with [national statistics](#). Technical feedback on this issue was provided to the CSO by the CLMS following a request made from Eurostat and the European Environmental Agency (EEA). The feedback outlined that these discrepancies are a consequence of uncertainty in class assignment of small linear formations of these classes. This would include tree lines, for which canopy size was more often overestimated in the 2018 iteration. However, it was explained that this was due to a methodological update between 2018 and 2021 iterations. These updates should carry through to future iterations, meaning improved comparability for these classes. Nonetheless, the error imparted to these accounts as a result means that the extents of Forest & Woodland ecosystem types (Broadleaved Deciduous Forest in particular) are almost certainly overestimated for 2018 compared to 2021.

4.1.2.3 PRIME 2

Although spatially very accurate, PRIME 2 features may not always be updated in or close to real time. This means that spatial objects which may inherently be less permanent (e.g. extraction sites) could be spatially delineated in the data several years after they change in real life. For example, one functional PRIME 2 class initially considered as relevant for classification of the level two ecosystem type Infrastructure & Industrial Areas was 'Area Under Construction'. However, of the 2,398 polygons of this class in the 2021 version of PRIME 2 used here, 1,214 were recorded as being last updated in 2012. However, overall, it is not expected that this type of error is common, as most PRIME 2 classes used for these accounts should not be so transient in nature. Another source of error from PRIME 2 includes areas classed as 'gardens'. When removal of these from PRIME 2 is not timely – particularly in rural settings – some areas of Croplands or Grasslands can be misclassified as Settlements & Other Artificial Areas. In this scenario, a landowner may give over an area of garden for agricultural use. However, this land use change may not be reflected in PRIME 2 until many years later. Generally, these types of conversions are also not expected to be common.

4.1.2.4 LPIS

The likely sources of error from LPIS can be summarised as follows:

- Parcels with land cover corresponding to different ecosystem types; parcels which had crop descriptions corresponding to different ecosystem types were not classified. However, as discussed, some parcels may have large extents of discrete landcover such as woodland or a lake which make up a significant portion their digitised area but are not spatially delineated. Such areas would be classified based on the single crop description associated with the entire parcel. Although the employed layering approach attempted to minimise this error, it may not have been completely removed.
- LPIS may not capture areas of Cropland or Grassland where growers are not claiming area-based payments. This error should also be minimal however, as the other data sources used for these ecosystem types (e.g. CLCplus Backbone or the HRL-VLCC Crop type data) are derived from earth observation and are consequently less biased.

4.1.2.5 CLC

The CLC classes used as evidence of occurrence of Semi-Natural and Natural Grasslands are not regarded by national experts to be particularly accurate. They are also mapped at a 25 ha MMU, meaning areas of Semi-Natural and Natural Grasslands smaller than 25 ha will not be captured. Although this data was qualified against evidence of mowing or ploughing from earth observation data, it is not clear how much this has improved the accuracy of this data.

4.1.2.6 NPWS Article 17 Grassland data

The definitions of the Grassland habitats covered in this data are subject to revision, meaning changes in the extent of this data could be due to definitional changes and not real-world extent changes.

4.1.2.7 Forest Survey data

The NSNW and ALEW survey data are the oldest source data used for these accounts. However, the total area of the forests captured by them is relatively small and many are protected by statute. They also overlap to a considerably degree with the administrative data provided by Coillte and DAFM. Nonetheless, it is possible that some of the surveyed areas are no longer forests. As before, the layer order should minimise instances of this data overlaying new data.

4.2 Accuracy of classified ecosystem extent map

Aggregating from the classified 10 × 10 m source map to the final 100 × 100 m ecosystem extent map (as illustrated in Figure 2) can introduce additional error. This tends to be the case when source land cover corresponding to two or more different ecosystem types occurs within the same 1-hectare pixel area. Since the mapped source data corresponds to 30 different possible ecosystem types, a final ecosystem classification given to a 1-hectare area could be based on a theoretical maximum majority of 3.3% (i.e. when the source data suggests an equal probability of all 30 ecosystems in a given hectare). In reality, the lowest majority observed was 21% for a level one ecosystem type and 17% for a level two ecosystem type.

The median majority for each level one and two ecosystem type is given in Tables 8 and 9, respectively. Generally, majorities are higher for ecosystem types which are larger in scale and more homogenous at landscape level (e.g. a large lake). By contrast, lower majorities are expected for ecosystems which may be more interspersed with other ecosystems (e.g. ecosystems characterised by artificial surfaces in remote and rural locations), or those which are linear in nature (e.g. Rivers & Streams).

Table 8 Median classification majority for each level one ecosystem type.

Ecosystem type	2018	2021
1 Settlements & Other Artificial Areas	94%	92%
2 Cropland	95%	94%
3 Grassland	97%	96%
4 Forest & Woodland	98%	98%
5 Heathland & Shrub	93%	93%
6 Sparsely Vegetated Ecosystems	73%	73%
7 Inland Wetlands	95%	95%
8 Rivers & Canals	68%	66%

9 Lakes & Reservoirs	100%	100%
10 Marine Inlets & Transitional Waters	100%	100%
11 Coastal Beaches, Dunes & Wetlands	96%	96%

Table 9 Median classification majority for each level two ecosystem type.

Ecosystem type	2018	2021
1.1 Continuous Settlement Area	63%	63%
1.2 Discontinuous Settlement Area	53%	52%
1.3 Infrastructure & Industrial Areas	68%	67%
1.4 Urban Greenspace	70%	70%
1.5 Other Artificial Areas	56%	56%
2.1 Annual Cropland	94%	94%
2.3 Permanent Cropland	71%	71%
2.6 Other Farmland	82%	86%
3.1 Sown Pastures & Other Grass	98%	97%
3.2 Natural & Semi-Natural Grasslands	90%	89%
4.1 Broadleaved Deciduous Forest	68%	67%
4.2 Coniferous Forest	70%	70%
4.4 Mixed Forests	74%	73%
4.5 Transitional Forest & Woodland Shrub	78%	78%
4.6 Plantations	98%	98%
5.2 Scrub & Heathland	94%	93%
6.1 Bare Rock	77%	76%
6.2 Semi-Desert, Desert & Other Sparsely Vegetated Areas	63%	62%
7.1 Inland Marshes & Other Wetlands on Mineral Soil	75%	73%
7.2 Mires, Bogs & Fens	96%	95%
8.1 Rivers & Streams	83%	68%
8.2 Canals, Ditches & Drains	100%	68%
9.1 Lakes & Ponds	100%	100%
9.2 Artificial Reservoirs	92%	92%
10.1 Coastal Lagoons	100%	100%
10.2 Estuaries & Bays	100%	100%
10.3 Intertidal Flats	100%	100%
11.2 Coastal Dunes, Beaches & Sandy & Muddy Shores	100%	100%
11.3 Rocky Shores	72%	72%
11.4 Coastal Saltmarshes & Salines	76%	74%

5. Future updates

5.1 Infrastructure & Industrial Areas (1.3)

This level two ecosystem type should include construction sites. As already mentioned, a significant number of those captured in PRIME 2 are likely out of date. However, PRIME 2 includes

feature digitisation dates. It may be possible to use these to filter out invalid features, rendering those remaining valid as source data for this ecosystem.

5.2 Agro-forestry (2.4)

This level two ecosystem type was not mapped as its occurrence was assumed to be negligible in Ireland. However, the CSO has since learned that agroforestry may increase due to the same policy objectives as outlined below for the Mixed Farmland ecosystem type. Further exploration of the data may also reveal this ecosystem to be more frequent than previously thought. The [HRL-VLCC Tree Cover and Forests](#) layers from CLMS and the woody land cover classes from CLCplus Backbone could offer a way of identifying areas of agroforestry in the LPIS data.

5.3 Mixed Farmland (2.5)

This ecosystem can also be referred to as ‘heterogenous agricultural areas’ and refers to plots of farmland containing a mixture of different types of permanent and annual crops. It may also include farmland ‘interspersed with significant natural areas’ and ‘small semi-natural elements which are associated with agricultural land use, such as hedges, ponds, [and] grassy margins’. Compared to most of the other ecosystems, this ecosystem is defined less objectively in the EU typology and the level of heterogeneity required for its classification is not explicitly stated.

Mixed Farmland has been increasingly underpinned by policy in recent years. For example, the Basic Income Support for Sustainability ([BISS](#)) Scheme for farmers – which is an area-based payment linked to LPIS parcels – now incentivises the maintenance of environmentally beneficial landscape features (i.e. non-productive areas). Furthermore, the Agri-Climate Rural Environment Scheme ([ACRES](#)) incentivises habitat creation and expansion (e.g. by planting of hedgerows and riparian buffer zones). ACRES, which is part of Ireland's CAP Strategic Plan for 2023-2027, is also an area-based payment scheme linked to LPIS parcels. Therefore, as with the Agroforestry ecosystem type, CLMS products may be used to assist in identifying LPIS parcels which display characteristics associated with the Mixed Farmland ecosystem type.

5.4 Natural & Semi-Natural Grasslands (3.2)

Data for this ecosystem type in Ireland is sparse and incomplete. As mentioned above, the data used here to delineate areas of this ecosystem type have a large degree of expected error, and the approach of using HRL-VLCC Grasslands layers to qualify them is also novel and untested. Therefore, areas characterised as this ecosystem type will also need to be validated and the employed identification method explored further by Eurostat.

5.5. Coastal ecosystems

The definitions of the level 1 ecosystem types 10 (‘Marine Inlets & Transitional Waters’) and 11 (‘Coastal Beaches, Dunes & Wetlands’) are currently being reviewed by Eurostat. Therefore, the extents of these ecosystems and the data used to classify them are likely to change in future iterations of these accounts due to definitional changes to their respective typologies. In addition, the level two ecosystem type ‘Artificial Shorelines’ (11.1) was not mapped as part of these accounts. This was mainly because corresponding data could not be identified, but the typological review should clarify what these data should be.

5.6 Ecosystem Accounting Area (EAA)

The terrestrial-transitional EAA used to produce these accounts was developed using a variety of data sources. However, the EAA is likely to be updated with the identification of new data to further minimise the inclusion of non-marine land cover.

6. Non-intuitive conversions between ecosystem types

6.1 Forest & Woodland to Grassland

When forests are felled, they become classified as temporary unstocked forests (TUF) and are classified as the ecosystem Transitional Forest & Woodland Shrub. However, sometimes such areas are ‘excised’ (e.g. sold) and removed from the forest inventory. The land can then be subject to a land use change. This may include a change to agricultural use, in which case the land may be converted to grassland. Additionally, when areas of woodland outside of the national forest inventory are felled, it is possible that they may convert to grassland over time.

6.2 Settlements & Other Artificial Areas to Grassland

There are four main scenarios in which this can occur:

- Areas of privately owned green field sites within built-up areas being put into pasture (as evidence by the addition of such sites into LPIS). In this case, Urban Greenspace may become Sown Pastures & Other Grass. Note, this may also account from conversions into Cropland.
- Sports fields (e.g. GAA pitches and golf courses) as recorded in PRIME 2 and which occur outside of built-up areas being put into pasture. This would also be an example of Urban Greenspace becoming Sown Pastures & Other Grass.
- Industrial sites, waste ground and construction sites outside of built-up areas being converted to Grassland.
- Large rural gardens recorded in PRIME 2 being put into pasture. Note, this may also account from conversions into Cropland.

6.3 Forest & Woodland to Settlements & Other Artificial Areas

This can occur when areas of woodland are incorporated as part of new industrial, commercial areas or residential areas. For example, Center Parcs in county Longford is located on a former Plantation (forestry) site and was constructed within the change period for these accounts.



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